BLINK: a language to view, recognize, classify and manipulate 3D-spaces

by

Lauro Didier Lins

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but this constraint does not exist, so I can continue…

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Resumo

Um *blink* é um grafo plano onde cada aresta ou é vermelha ou é verde. Um *espaço 3D* ou, simplesmente, um *espaço* é uma variedade 3-dimensional conexa, fechada e orientada. Neste trabalho exploramos pela primeira vez em maiores detalhes o fato de que todo blink induz um espaço e todo espaço é induzido por algum blink (na verdade por infinitos blinks). Qual o espaço de um triângulo verde? E de um quadrado vermelho? São iguais? Estas perguntas foram condensadas numa pergunta cuja busca pela resposta guiou em grande parte o trabalho desenvolvido: quais são todos os espaços induzidos por blinks pequenos (poucas arestas)? Nesta busca lançamos mão de um conjunto de ferramentas conhecidas: os *blackboard framed links* (BFL), os *grupos de homologia*, o *invariante quântico* de Witten-Reshetikhin-Turaev, as *3-gems* e sua teoria de simplificação. Combinamos a estas ferramentas uma teoria nova de decomposição/composição de blinks e, com isso, conseguimos identificar todos os espaços induzidos por blinks de até 9 arestas (ou BFLs de até 9 cruzamentos). Além disso, o nosso esforço resultou também num programa interativo de computador chamado BLINK. Esperamos que ele se mostre útil no estudo de espaços e, em particular, na descoberta de novos invariantes que complementem o invariante quântico resolvendo as duas incertezas deixadas em aberto neste trabalho.

Palavras-chave: topologia, 3-variedades fechadas conexas e orientadas, grafos planos, espaços, *graph encoded manifolds*.

Abstract

A *blink* is a plane graph with its edges being red or green. A *3D-space* or, simply, a *space* is a connected, closed and oriented 3-manifold. In this work we explore in details, for the first time, the fact that every blink induces a space and any space is induced by some blink (actually infinitely many blinks). What is the space of a green triangle? And of a red square? Are they the same? These questions were condensed into a single one that guided a great part of the developed work: what are all spaces induced by small blinks (few edges)? In this search we used a known set of tools: the *blackboard framed links* (BFL), the *homology groups*, the *quantum invariant* of Witten-Reshetikhin-Turaev, the *3-gems* and its simplification theory. Combining these tools with a new theory of decomposition/composition of blinks we could identify all spaces induced by blinks with up to 9 edges (or BFLs with up to 9 crossings). Besides that, our effort resulted in an interactive computer program named BLINK. We hope that this program becomes useful in the study of spaces, in particular, in the discovery of new invariants that complement the quantum invariant and homology group solving the two uncertainties that we left open in this work.

Keywords: topology, closed connected oriented 3-manifolds, plane graphs, spaces, graph encoded manifolds.

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CHAPTER 1

Introduction

1.1 Initial motivation

Unexplored simplicity. This was the reason for the birth of this work. Let me explain. Topology deals with, among other objects, the so called *3-manifolds*. A basic type of 3-manifold is a *closed, connected, oriented 3-manifold* and, in this work, the term *space* will be used as a synonym for it.[1] In 1994, Kauffman and Lins [**?**] introduced a new way to present spaces. They named their new presentation *blinks*. In fact, on their work, blinks were appreciated as being a new concise presentation for spaces, but its main importance there was its use as an intermediate step to convert a *blackboard framed link* presentation of a space into a *3-gem* presentation of the same space. This conversion, among other results, is central to this work, but we will get to it later. What I want to say now is what attracted me to this object named blink. Here it is.

Blink states that a triangle is a space. That a square is a space. That any plane graph (i.e. any drawing in a plane made of points connected by curves that do not intersect) is a space.

What space has the form of a triangle? And the form of a square? I found this connection between plane graphs and spaces very elegant. This elegance becomes even more special when we see that other space presentations have more "complicated" drawings than blink presentation does. For example, the following three drawings are different presentations for space $\mathbb{S}^3/<3,3,2>$. [2]

[1] The term "space" is also used as a synonym for a 3-manifold (any 3-manifold), but here we will use it as a synonym only for a closed, connected, oriented 3-manifold.

[2] That is, the quotient of the 3-sphere under the action of the binary tetrahedral subgroup, which is a non-abelian group of order 12.

The first is a blink presentation, the second is a blackboard framed link presentation and the third is a 3-gem presentation. In this example it is clear that the blink presentation is simpler. Its perceptual complexity is smaller. Indeed this is always the case. No other space presentation has simpler drawings than blink does. Blackboard framed links don't, 3-gems don't. *special spines* don't, *Heegaard diagrams* don't.

This simplicity aspect of blinks allied to the fact that they were not studied before, except as a by product on the books [**?**, **?**] made me decide to explore it. To see the greatest number of spaces through blink drawings was the initial intent, but the hope was also that so much elegance and simplicity is not in vain and it could, by the fact that it was not explored before, hold some yet unknown secret of spaces.

1.2 Historical overview

In 1962 Lickorish [**?**] revolutionized the area of spaces by proving in a purely combinatorial way a result first published by Wallace [**?**] two years before by means of differential topology. The result has, as a corollary, the following fact:

Given any space M, there exists a finite number k of disjoint solid tori $T_i \subset M$ such that $M \setminus \bigcup_{i=1}^{k} T_i$ is homeomorphic to $\mathbb{S}^3 \setminus \bigcup_{i=1}^{k} T_i'$, for a corresponding set of disjoint solid tori $T_i' \subset \mathbb{S}^3$.

Another consequence of Lickorish's Theorem permits the presentation of an arbitrary space as a link diagram in the plane with an integer attached to each one of the components, the so called *framed links*. The revolution was completed in 1978 when Kirby [**?**] published his now famous calculus on framed links. This paper spurred an enormous activity in the area paving the way to prove deep theorems by a specific kind of diagrammatic calculus with well defined rules.

Framed links can be freed from the integers associated to their components if one introduces curls in their projections so as to have the frame of a component equal to its writhe, thus producing a *blackboard framed link* or a *BFL*. In this way, every space presents itself as a blackboard framed link. A reformulation of Kirby's calculus into blackboard framed link language is presented in [**?**]: a formal BFL calculus. The importance of the BFL presentation is testified by the fact that we can obtain from it the Witten-Reshetikhin-Turaev quantum invariant (or WRT-invariant) of the induced space [**?**, **?**]. This is not possible, at least it is unknown at the present, from a triangulation [**?**], from a Heegaard diagram [**?**] or from a *special spine* [**?**] of the space. In this work the *QI* or quantum invariant of a space mean their WRT-invariants computed at $A = e^{i\pi/2r}$ [**?**].

A BFL can be reformulated into the object named *blink* also introduced in [**?**]. The presentation by blink is concise and permits, as BFLs does, the computation of best invariants available. But how do we prove that two blinks yielding the same invariants are manifestations of the same space? Kirby's moves, although a theoretical masterpiece, are in this practical con-

text of no use, except in very limited circumstances. For this task, the TS-moves and U-move on gems of Lins [**?**] are much better. The applicability of the gem simplifying dynamics is available because from a blink it is straightforward to produce a gem inducing the same space [**?**]. Summarizing, the task of classifying blinks has to rely on gem theory which is, at present, an indispensable complement to perform the task. The topological classification of gems with 30 vertices (extending the classification of [**?**] using again TS- and U-moves) has been recently accomplished [**?**].

1.3 What we did

In Section 1.1 we said our intent was to see the greatest number of distinct spaces through blinks (*i.e.* blink drawings). To be able to accomplish this task, the most important question we must know how to answer is whether two blinks A and B are actually presentations of the same space. A fact we did not mention before is that any space has infinitely many distinct blink presentations. So, to answer this question is not just checking that $A = B$ or $A \neq B$. The relation space-blink is not a one to one relation.

As mentioned in Section 1.2, blink is a direct reformulation of blackboard framed link (BFL). It is easy to go from a blink presentation of a space to a BFL presentation of the same space and vice-versa. We also mentioned that a formal calculus for BFLs is well known. This means that a set of BFL operations or moves is known such that any pair of BFLs induce the same space if and only if there is a path, *i.e.* a finite sequence of operations or moves in this set, that transforms one BFL into the other. So, we could answer our question like this: obtain a BFL presentation for A, obtain a BFL presentation for B, then show a path in the BFL calculus transforming A into B, proving that they induce the same space; or show that such a path does not exist, and conclude that they induce different spaces. Although this approach is correct and theoretically possible, it is not practical. How to show a proof that a path does not exist? Despite of this practical gap, one of the contributions of this thesis is a reformulation of the BFL calculus into a purely blink calculus.

Section 1.2 also mentions that from a blink we are able to calculate some space invariants. For example, it is possible to obtain the homology group or the Witten-Reshetikhin-Turaev quantum invariant of its space. Indeed, this is the first thing we do to answer whether blink A induces the same space as blink B. We calculate these two invariants and if any of them are different we can answer for sure that the blinks induce different spaces. But, if they are both the same, we cannot say their spaces are the same. No complete invariant for spaces is known. So, any known space invariant may fail to distinguish different spaces.

When the space of blink A is not distinguished from the space of blink B by the space

invariants, we must use another tool to answer our question. This other tool is 3-gem theory. The book [**?**] shows a way to obtain a 3-gem presentation from a blink presentation inducing the same space. We improved this algorithm in Chapter 4. In [**?**] a nice algorithm to simplify 3-gems is presented. So the last thing we do to answer our question is to check whether the blinks A and B not distinguished by the space invariants have their 3-gems simplified to a common 3-gem. If this is the case then we are sure that A and B induce the same space. If not, then we are not sure. It is a hint that they are different but this cannot be said. For small blinks, as we will see later, there are only two uncertainties left out of ≈ 500.

This approach of testing the homology group and the WRT-quantum invariant to distinguish blinks and then, if not distinguished, applying the 3-gem simplifying algorithm to show that they induce the same space was very successful in our experiments as we will see in Chapter 5. Its only constraint is that it works only for small blinks and 3-gems. The computational effort to calculate quantum invariants or to simplify 3-gems is exponential in the sizes of the blinks and of the 3-gems, respectively.

Let's return to our initial intent: isolating the largest number of spaces through blinks. We already know how to test if two (small) blinks do induce the same space or not. The next important thing to define is for what blinks we are going to ask these questions. To try all possible blinks is prohibitive and unnecessary. As we will see, we can search for spaces in only a small fraction of all possible blinks and yet not lose anything. To get to this optimization we first developed a useful decomposition/composition theory of blinks in Chapter 3 (actually the theory was developed for its combinatorial counterpart: the g-blink). Then, using the results and operations of blink calculus and BFL calculus we filtered some redundant blinks. This resulted in a small set of blinks for which we could identify all spaces. We also could isolate interesting sets of small blinks inducing the same spaces such that a path in blink calculus or BFL calculus is not trivial to identify. These sets may lead to new ideas for theorems or space invariants.

A contribution of this thesis is a computer program named BLINK. It was responsible for most of the figures in this document. It also supports the most important concepts discussed in the following chapters and we hope that it will become popular and help researchers and stu-

dents to learn, do research or just appreciate spaces through the language of blinks, blackboard framed links or 3-gems which are the objects that it supports at the moment.

1.4 The structure of this thesis

In Chapter 2 we begin with a review of the basic topological language and concepts needed in the remaining of the thesis. We then introduce *knots and links* and their diagrams. After that we introduce *framed links* and *blackboard framed links* (BFL) and show how they encode spaces. A calculus for blackboard framed links is presented.

In Chapter 3 we define the motivating object of this work: a *blink*. We show that blinks are a simple reformulation of blackboard framed links with the advantage of having simple drawings. We then reformulate the BFL calculus shown in Chapter 2 in blink language. From blinks we define a new combinatorial object named *g-blinks*. We show how to obtain the homology group and quantum invariant of Witten-Reshetikhin-Turaev invariants from a g-blink. The code of a g-blink is then presented. Then some involutions of g-blinks are defined: dual, reflection and refDual. The concept of a representative g-blink is introduced based on the previous results shown for g-blinks. We end the chapter showing how to identify all spaces that are induced by small blinks and what is the missing piece to do that: a way to prove homeomorphisms.

In Chapter 4 we define 3-gems: another way to present spaces. We then show some moves that can be done in 3-gems without changing the induced space. These moves yields a viable computational way to prove homeomorphism of spaces: a combinatorial simplification dynamics of 3-gems. To connect blinks and 3-gems we show an improved way to obtain, from a blink, a 3-gem inducing the same space. We finish this chapter with the proof, via 3-gems, of a theorem on g-blinks stated in Chapter 3: the partial reflection theorem.

In Chapter 5 we present the computational experiments and results that we have obtained. We define formally what we are searching: a census of prime spaces. Then we construct a small set named U that has the *9-prime-unavoidable* property. We then show how we topologically identified the spaces of every g-blink in U. We finish the chapter exploring another set of

g-blinks: simple 3-connected monochromatic blinks.

In Chapter 6 we review the main contributions of this work, talk a little about the program BLINK and about a theoretical contribution that we did not finish on time to this thesis: a polynomial algorithm to obtain the blink of a 3-gem. Some research problems that can be explored as a continuation of this work are also shown.

CHAPTER 2

Topology, manifolds, links and blackboard framed links

2.1 Topology, manifolds and what we call here "spaces"

In topology the shape of a cup of coffee is equivalent to the shape of a doughnut. Everybody knows that if we try to put coffee on a doughnut the result is not the same as if we try to put coffee on a cup of coffee. So, our first conclusion is: what topology states as "equivalent shapes" is definitively not aligned with our practical understanding of equivalent shapes. One of the main problems that topology deals is classifying shapes as equivalent or not and, at the end, describing what are all possible shapes. In this section, based on the clean and direct approach of [**?**], we present an introduction to elementary topology to settle the vocabulary and the basic concepts needed. At the end we define what are *manifolds* and the specific class of closed, connected, oriented manifolds which are the "shapes" that we are interested in this work.

In the XVIII century, the city of Königsberg, Prussia (now Kaliningrad, Russia) had seven bridges over the Pregel river connecting two islands and other parts of the city as is shown in Figure 2.1A. A famous problem concerning Königsberg was whether it was possible to take a walk through the town in such a way as to cross over every bridge only one time. Figure 2.1B shows a wrong walk attempt: by the time the sixth bridge is crossed the only uncrossed bridge is unreachable.

No one was able to do this walk, and yet nobody knew how to prove that it could not be done. In 1735, some college students sent this problem to Leonhard Euler, one of the greatest mathematician of all time. Euler was able to prove mathematically that this walk was

(A) (B)

Figure 2.1 Seven bridges of Königsberg

impossible. This result did not depend on the lengths of the bridges, nor on their distance from one another, but only on connectivity properties: which bridges are connected to which islands or riverbanks. What Euler captured with the "Problem of the Seven Bridges of Königsberg" is the motivating insight behind topology:

some geometric problems depend not on the exact shape of the objects involved, but rather on the "way they are connected together".

Leonhard Euler's 1736 paper on Seven Bridges of Königsberg is regarded as one of the first topological results and also led to graph theory, a branch of mathematics with "infinite" applications [**?**, **?**].

Topology, in its present form, long after Euler, uses the term *topological space* for what we called a "shape" on the beginning of this section. Before defining what are *topological spaces* we define *metric spaces*, as they are the source for the concrete "shapes" or *topological spaces* that we are interested.

METRIC SPACES

A *metric* or a *distance* in a set X is a function $\rho : X \times X \to \mathbb{R}_+ = \{x \in \mathbb{R} \,|\, x \geq 0\}$ that satisfies

(1) $\rho(x,y) = 0$, iff $x = y$,

(2) $\rho(x,y) = \rho(y,x)$, for every $x,y \in X$,

(3) $\rho(x,y) \leq \rho(x,z) + \rho(z,y)$, for every $x,y,z \in X$. (*triangle inequality*)

The pair (X,ρ), where ρ is a metric in X, is called a *metric space*. The function

$$\mathbb{R}^n \times \mathbb{R}^n \to \mathbb{R}_+ : (x,y) \mapsto \sqrt{\sum_{i=1}^{n} (x_i - y_i)^2}$$

is a metric in $\mathbb{R}^n$ and is called *euclidean* metric.

Let (X,ρ) be a metric space, let a be a point in X, and let r be a positive real number. The sets

$$B_r(a) = \{x \in X \,|\, \rho(a,x) < r\},$$

$$D_r(a) = \{x \in X \,|\, \rho(a,x) \leq r\},$$

$$S_r(a) = \{x \in X \,|\, \rho(a,x) = r\}$$

are called, respectively, *open ball*, *closed ball*, and *sphere* of the space (X,ρ) with center a and radius r. If (X,ρ) is a metric space and $A \subset X$, then the restriction of metric ρ to $A \times A$ is a metric in A, and $(A, \rho|_{A\times A})$ is a metric space. It is called a *subspace* of (X,ρ). The ball $D_1(0)$ and the sphere $S_1(0)$ in $\mathbb{R}^n$ with the euclidean metric are denoted by symbols D^n and S^{n-1} and called *n-dimensional ball* and $(n-1)$*-dimensional sphere*. They are considered as metric spaces with the metric restricted to $\mathbb{R}^n$. Note that: D^1 is the segment $[-1,1]$; D^2 is a disk; S^0 is the pair of points {-1,1}; $\mathbb{S}^1$ is a circle; $\mathbb{S}^2$ is a sphere; D^3 is a ball. The words disk, circle, sphere and ball were used, in last sentence, appealing to their common sense meaning. Now, for this work, they have a formal meaning: a *disk* is D^2, a *circle* is $\mathbb{S}^1$, a *sphere* is $\mathbb{S}^2$ and a *ball* is B^3.

TOPOLOGICAL SPACES

A *topological space* is a set X with a collection Ω of subsets of X satisfying the following three axioms:

(1) the empty set $\varnothing$ and X are in Ω,

(2) the union of any collection of sets in Ω is in Ω,

(3) the intersection of any pair of sets in Ω is in Ω.

The collection Ω is called a *topological structure* or a *topology* in X. The sets in Ω are called *open*. The elements of X are called *points*. A set $F \in X$ is said *closed* in the space (X,Ω) if its complement $X \backslash F$ is open (*i.e.* $X \backslash F \in \Omega$). Note that $\varnothing$ and X are both open and closed. A *neighborhood* of a point is any open set containing that point. A collection Σ of open sets is called a *base* for a topology (*i.e.* topological structure), if each nonempty open set is a union of sets belonging to Σ.

The following result connects metric spaces and topological spaces:

the collection of all open balls in a metric space (X,ρ)
is a base for some topology in X.

For example, consider $\mathbb{R}^2$ with the euclidean metric. Then, a topology for $\mathbb{R}^2$ is the set of all unions of open balls (open disks in the plane). This topology is the default topology when nothing else is mentioned.

Let (X,Ω) be a topological space, and $A \subset X$. Denote by Ω_A the collection of sets $A \cap V$, where $V \in \Omega$. Then,

Ω_A *is a topological structure in* A.

The pair (A,Ω_A) is called a *subspace* of the space (X,Ω). The collection Ω_A is called the *subspace topology* or the topology *induced* on A by Ω, and its elements are the open sets in A.

At this point, we can think, for instance, of $\mathbb{S}^2$ as a topological space. We know that the collection of open balls of $\mathbb{R}^3$ (as a metric space with the euclidean metric) is a base for a

topology in $\mathbb{R}^3$. Consider this topology to view $\mathbb{R}^3$ as a topological space. Restrict this topology of $\mathbb{R}^3$ to $\mathbb{S}^2$ to obtain a topology for $\mathbb{S}^2$: $\mathbb{S}^2$ is now a topological space. In this work this logical sequence to obtain a topology for a subset of $\mathbb{R}^n$ is always the one considered. So, from now on, every subset of $\mathbb{R}^n$ may also be viewed as a topological space. For example the surface of doughnut and of the coffee cup considered in the beginning of this section may now be viewed as subsets of $\mathbb{R}^3$ and, consequently, as topological spaces.

MAPS

In the context of topology, the terms *map* and *mapping* are synonyms of function. A mapping $f : X \to Y$ is called a *surjective map*, or just a *surjection* if every element of Y is an image of at least one element of X. It is called an *injective map*, *injection* or *one-to-one map* if every element of Y is an image of, at most, one element of X. A mapping is called a *bijective map*, *bijection*, or *invertible* if it is surjective and injective.

The *image* of a set $A \subset X$ under a map $f : X \to Y$ is the set of images of all points of A. It is denoted by $f(A)$. Thus,

$$f(A) = \{f(x) : x \in A\}.$$

The image of the entire set X (*i.e.* $f(X)$) is called the *image* of f. The *preimage* of a subset of $B \subset Y$ under map $f : X \to Y$ is the set of elements of X whose images belong to B. It is denoted by $f^{-1}(B)$. Thus,

$$f^{-1}(B) = \{x : f(x) \in B\}.$$

CONTINUOUS MAPS

Let X, Y be topological spaces. A map $f : X \to Y$ is said to be *continuous* if the preimage of any open subset of Y is an open subset of X. A map $f : X \to Y$ is said to be *continuous at point* $a \in X$ if for every neighborhood U of $f(a)$ there exists a neighborhood V of a such that $f(V) \subset U$. One result about continuous maps is that: a map $f : X \to Y$ is continuous iff it is continuous at each point of X. Another result is that this notion of continuity coincides with the one that is usually studied in calculus:

Let X,Y be metric spaces, and $a \in X$. A map $f : X \to Y$ is continuous at the point a, iff for every $.pdfilon > 0$ there exists a $\delta > 0$ such that for every point $x \in X$ inequality $\rho(x,a) < \delta$ implies $\rho(f(x), f(a)) < .pdfilon$.

HOMEOMORPHISM

Now we are able to formally define the "topologically equivalence" concept. An invertible mapping is called a *homeomorphism* if it is continuous and its inverse is also continuous. A topological space X is said to be *homeomorphic* to space Y if there is a homeomorphism $X \to Y$. Being homeomorphic is *an equivalence relation*. Let X, Y and Z be topological spaces then: (1) X is homeomorphic to X; (2) if X is homeomorphic to Y then Y is homeomorphic to X; and (3) if X is homeomorphic to Y and Y is homeomorphic to Z then X is homeomorphic to Z.

Some examples of homeomorphic topological spaces: $[0,1]$ and $[a,b]$ for any $a < b$; $(-1,1)$ and $\mathbb{R}$; an open disk and the plane $\mathbb{R}^2$; $\mathbb{S}^n \backslash \{\text{point in } \mathbb{S}^n\}$ and $\mathbb{R}^n$. Some examples of non-homeomorphic topological spaces: balls D^p, D^q with $p \neq q$; spheres S^p, S^q with $p \neq q$; punctured plane $\mathbb{R}^2 \backslash \{\text{point}\}$ and a plane with a hole $\mathbb{R}^2 \backslash \{(x,y) : x^2 + y^2 < 1\}$.

From the topological point of view homeomorphic spaces are completely identical: a homeomorphism $X \to Y$ establishes one-to-one correspondence between all phenomena in X and Y which can be expressed in terms of topological structures. Thus, two spaces are *topologically equivalent* or *the same for the purposes of topology* if there is a homeomorphism between them. There is a homeomorphism between the surface of a doughnut and the surface of a coffee cup, so they are topologically equivalent.

As we pointed out on the first paragraph of this section, not yet in the correct language, the topological equivalence problem or *homeomorphism problem* is one of the classic and important problems of topology:

Given two topological spaces, are they homeomorphic?

To prove that topological spaces are homeomorphic, it is enough to present a homeomorphism between them. Essentially this is what is done in this case. However, to prove that topologi-

cal spaces are not homeomorphic, it does not suffice to consider any special mapping, and is usually impossible to review all mappings. Therefore for proving non-existence of a homeomorphism one uses indirect arguments. In particular, one finds a property or a characteristic shared by homeomorphic spaces such that one of the spaces has it, while the other does not. Properties and characteristics shared by homeomorphic spaces are called *topological properties* or *invariants*. For instance, the cardinality of the set of points and of the set of open sets is a topological invariant.

EMBEDDING

A continuous mapping $f : X \to Y$ is called a *(topological) embedding* if the mapping $f' : X \to f(X)$ is a homeomorphism, where $f'(x) = f(x)$ for all $x \in X$. Embeddings $f_1, f_2 : X \to Y$ are said to be *equivalent* if there exist homeomorphisms $h_X : X \to X$ and $h_Y : Y \to Y$ such that $f_2 \circ h_X = h_Y \circ f_1$.

Note that homeomorphisms are special kind of embeddings, where the mapping is surjective.

COVER

A collection Γ of subsets of a set X is called a *cover* or a *covering* if the union of the elements of Γ contains X, *i.e.*, $X \subset \cup_{A \in \Gamma} A$. A cover Γ of a topological space X is said to be an *open cover* if every element of Γ is an open set. A cover Γ of a topological space X is said to be a *closed cover* if every element of Γ is a closed set. If Σ covers X and Γ covers X and $\Sigma \subset \Gamma$, then Σ is a *subcover* or *subcovering* of Γ.

CONNECTEDNESS

A topological space X is said to be *connected* if it has only two subsets which are both open and closed: $\varnothing$ and the entire X. Although this definition is clear, at first, it is not intuitive. Let's get a more intuitive definition. A *partition* of a set is a cover of this set with pairwise disjoint sets. To *partition* a set means to construct such a cover. Now the equivalent notion of connectedness of a topological space:

A topological space is connected iff it cannot be partitioned into two nonempty open sets iff it cannot be partitioned into two nonempty closed sets.

For instance, consider the topological space obtained as a subspace of the plane that consists of two disjoint open disks (open balls) (*e.g*: one open ball $B_1(-1,-1)$ and $B_1(1,1)$). This topological space is not connected, because the two open disks, that are open sets, form a partition of the entire space.

A *connected component* of a space X is a maximal connected subset of X (*i.e.* a connected subset, that is not contained strictly in other larger subset of X). Some properties of connected components: every point belongs to some connected component; connected components are closed; two connected components are disjoint or coincident. The image of a connected space under a continuous mapping is connected, so connectedness is a topological property. The number of connected components is a topological invariant.

COMPACTNESS

A topological space X is said to be *compact* if any of its open covers has a finite subcover, *i.e.* if Γ is a cover for X then exists a finite $\Sigma \subset \Gamma$ that also covers X. The image of a compact space by a continuous mapping is also compact, so compactness is a topological property.

Compactness is a sort of topological counter-part for the property of being finite in the context of set theory. Example of s non-compact space: $\mathbb{R}^n$. Example of a compact space: $\mathbb{S}^n$. Indeed a subset of $\mathbb{R}^n$ is compact if and only if it is closed and bounded (*i.e.* contained in an open ball).

HOMOTOPY

Let f,g be continuous maps of a topological space X to a topological space Y, and $H : X \times [0,1] \to Y$ a continuous map such that $H(x,0) = f(x)$ and $H(x,1) = g(x)$ for any $x \in X$. Then f and g are said to be *homotopic* and H is called a *homotopy* between f and g. Homotopy of maps is an equivalence relation: (1) if $f : X \to Y$ is a continuous map then $H : X \times [0,1] \to Y$

defined by $H(x,t) = f(x)$ is a homotopy between f and f; (2) if H is a homotopy between f and g then H' defined by $H'(x,t) = H(x,1-t)$ is a homotopy between g and f; (3) if H is a homotopy between f and f' and H' is a homotopy between f' and f'' then H'' defined by

$$H''(x,t) = \begin{cases} H(x,2t) & \text{for } t \leq 1/2, \\ H'(x,2t-1) & \text{for } t \geq 1/2, \end{cases}$$

is a homotopy between f and f''.

ISOTOPY

Let X, Y be topological spaces, $h, h' : X \to Y$ homeomorphisms. A homotopy $h_t : X \to Y$, $t \in [0,1]$ connecting h and h' (*i.e.*, with $h_0 = h$, $h_1 = h'$) is called a *isotopy* between h and h' if h_t is a homeomorphism for each $t \in [0,1]$. Homeomorphisms h, h' are said to be *isotopic* if there exists an isotopy between h and h'. Being isotopic is an equivalence relation on the set of homeomorphisms $X \to Y$.

The concept of isotopy may also be applied to embeddings. Let X, Y be topological spaces, $h, h' : X \to Y$ topological embeddings. A homotopy $h_t : X \to Y$, $t \in [0,1]$ connecting h and h' (*i.e.*, with $h_0 = h$, $h_1 = h'$) is called an *(embedding) isotopy* between h and h' if h_t is an embedding for each $t \in [0,1]$. Embeddings h, h' are said to be *isotopic* if there exists an isotopy between h and h'. Being isotopic is an equivalence relation on the set of embeddings $X \to Y$.

A family A_t, $t \in I = [0,1]$ of subsets of a topological space is called an *isotopy of the set* $A = A_0$ if the graph $\Gamma = \{(x,t) \in X \times I \,|\, x \in A_t\}$ of the family is *fibrewise homeomorphic* to the cylinder $A \times I$, *i.e.* there exists homeomorphisms $A \times I \to \Gamma$ mapping $A \times \{t\}$ to $\Gamma \cap X \times \{t\}$ for any $t \in I$. Such a homeomorphism gives rise to an isotopy of embeddings $\Phi_t : A \to X$, $t \in I$ where Φ_0 is the identity mapping and $\Phi_t(A) = A_t$. An isotopy of a subset is also called a *subset isotopy*. Subsets A and A' of the same topological space are said to be *isotopic in* X, if there exists a subset isotopy A_t of A with $A' = A_1$. The isotopic relation over the set of subsets of a topological space X is an equivalence relation.

An isotopy of a subset $A \in X$ is said to be *ambient*, if it may be accompanied with an embed-

ding isotopy $\Phi_t : A \to X$ extendible to an isotopy $\tilde{\Phi}_t : X \to X$ of the identity homeomorphism of space X. The isotopy $\tilde{\Phi}_t$ is said to be *ambient* for Φ_t. Two isotopic subsets of a topological space may not be ambient isotopic. Any pair of circles $\mathbb{S}^1$ embedded in $\mathbb{S}^3$ is isotopic, but a circle (Figures 2.2A) and a trefoil (Figures 2.2B) are not ambient isotopic.

MANIFOLDS

Let n be a non-negative integer. A topological space X is called *locally euclidean space of dimension n* if each point of X has a neighborhood homeomorphic either to $\mathbb{R}^n$ or $\mathbb{R}^n_+$ (*i.e.* $\mathbb{R}^n_+ = \{x \in \mathbb{R}^n : x_1 \geq 0\}$, defined for $n \geq 1$). Examples of locally euclidean spaces: $\mathbb{R}^n$; $\mathbb{S}^n$, D^n.

A topological space is called *Hausdorff space* or just *Hausdorff* if any two distinct points possess disjoint neighborhoods. Result: any metric space is Hausdorff (*i.e.* the topological space with topology induced from the metric space is Hausdorff).

A space is said to satisfy the *second axiom of countability* or to be *second countable* if it has a countable base. Result: any metric space is Hausdorff (*i.e.* the topological space with topology induced from the metric space has a countable base).

A *manifold of dimension n* or n-manifold is a topological space that satisfies:

(1) it is a locally euclidean space of dimension n,

(2) it is Hausdorff,

(3) it is second countable.

Examples of *n-manifolds*: $\mathbb{R}^n$; $\mathbb{S}^n$, D^n.

The definitions until now were very formal, but this one will not be formal. A manifold of dimension n is called *non-orientable* if it is possible to take the homeomorphic image of an n-dimensional ball in the manifold and move it through the manifold and back to itself, so that at the end of the path, the ball has been reflected. The Möbius band and Klein bottle are the most famous examples of non-orientable manifolds. A manifold which is not non-orientable is *orientable*. An orientable space has two orientations and the choice of one of them makes the space an *oriented* space.

SPACES FOR US.....

In this work we are interested in studying a specific kind of "shape" or, as we learned, topological space. This is it:

connected, closed, oriented 3-manifolds.

The adjective *closed* applied to a 3-manifold means that it is boundary free and compact. We use, from now on, the word *space* to denote these topological spaces. This is not a perfect choice, as "space", even in mathematics, has a lot of meanings. It could be a metric space. A vector space. A topological space not matching these constraints of being compact, connected, oriented. A common use for space, for instance, is any 3-dimensional topological space or any 3-manifold. These include our spaces but others too. In spite of all these, here, space will be exactly this: a connected, compact, oriented 3-manifold. So let's put it big:

A **space** *in this work is the same as*
a connected, closed, oriented 3-manifold.

2.2 Knots, links and diagrams

In general terms, *knot theory* studies the *placement problem*. As stated in [**?**], this problem is

Given topological spaces X and Y, classify how X may be placed within Y. Here the "how" is usually an embedding, and classify often means up to some form of movement of X in Y (isotopy, for example).

When X is the circle $\mathbb{S}^1$ and Y is the 3-dimensional space $\mathbb{R}^3$ or $\mathbb{S}^3$, we have *classical knot theory*. In this section we see, for this classical knot theory, a characterization of what are the equivalent embeddings. Things shown here form the basis for the approach to the problem of characterizing homeomorphic spaces (connected, compact, oriented 3-manifolds) that we show later.

An embedding of a circle $\mathbb{S}^1$ in the 3-dimensional space $\mathbb{R}^3$ or in the 3-sphere $\mathbb{S}^3$ is called a *knot*. An embedding of a collection of circles in the 3-dimensional space $\mathbb{R}^3$ or in the 3-sphere $\mathbb{S}^3$ is called a *link*. Each circle (or the image of one) in a link is called a *component* of the link. So, a knot is a link with only one component. Figure 2.2 shows some links[1]. The link of Figure 2.2A is also a knot (one component) and is suggestively called *unknot*. Figure 2.2B is the knot called *trefoil*. Figure 2.2C is the knot called *figure eight knot*. Figure 2.2D is a link with two components. Figure 2.2E is a link with three components and it is called the *borromean rings*. This link has an interesting property: we cannot separate the three rings without breaking one of them, *i.e.* the three rings are *linked*, even though, any two rings are separable without breaking (*i.e.* any pair of rings is unlinked).

Actually, Figure 2.2 presents the projection on the "plane of this paper" of thin cylinders centered and following the 1-dimensional strings that are the 3-dimensional image of the circles through the embeddings or links. It happens that we could replace Figure 2.2 by Figure 2.3 without loosing any important information. Each of this drawings is called a *knot diagram* (if only one component) or *link diagram* (any number of components). On each crossing that

[1]These figures were created using the beautiful tool called KNOTPLOT that was part of the phd thesis of Robert Scharein [**?**].

(A) (B) (C) (D) (E)

Figure 2.2 Knots and links

appears in the plane projection of the cylinders, there is one cylinder segment on top of another cylinder segment. This is represented by a continuous curve (top segment) and a broken curve (bottom segment).

(A) (B) (C) (D) (E)

Figure 2.3 Knots and links diagrams

So, a link diagram can be seen as a 4-regular *plane graph* with an extra information on each vertex. For example, the trefoil may be seen as the plane graph of Figure 2.4A. The extra information of the vertices is shown on Figure 2.4B and it encodes, in an intuitive way, exactly the information of which "cylinder segment" is on top and which "cylinder segment" is below. Note that there are two possibilities for this "extra information". They are shown in Figure 2.4C. The a curve (b curve) in this figure is said to be the *overcrossing* (*undercrossing*) line in the top case and the *undercrossing* (*overcrossing*) line in the bottom case.

Given two links, an interesting question to answer is whether these links can be aligned without tearing any of the strings. For example the links A and B given by their diagrams on Figure 2.5 can be aligned as is shown. Imagine this sequence of "moves" transforming A and B occurring on the 3-dimensional space. It is intuitive that we need no tearing. On the other hand, the circle and the trefoil (note the crossings on A to see that it is not a trefoil) cannot be aligned without tearing. These are examples of the placement problem for links. We say

Figure 2.4 Link diagram as plane graphs

Figure 2.5 Ambient isotopic knots

two links are placed the same way in 3-dimensional space if this alignment can be done. The formal term for this alignment, defined in Section 2.1, is: ambient isotopy. Ambient isotopy is an equivalence relation and when we say that links are equivalent we are referring to the ambient isotopy relation. So A and B in Figure 2.5 are equivalent, but are not equivalent to the trefoil.

Reidemeister [**?**] proved the following result about link equivalence in the diagrammatic language:

two links are equivalent (i.e. ambient isotopic) if and only if
any diagram of one link can be transformed into a diagram for the other link
via a sequence of Reidemeister Moves (Figure 2.6).

We use the symbol $\overset{A}{\sim}$ between two link diagrams or detached pieces of link diagrams (where the boundaries of these pieces have a correspondence that should be clear) to denote that they are ambient isotopic. Note that the Reidemeister moves we used in the transformation of Figure 2.5 were type II move, type I move and alignments. The three Reidemeister moves will be also called RE_1, RE_2 and RE_3 for moves of type I, type II and type III, respectively. Two link diagrams that differ by a finite sequence of Reidemeister moves RE_2 and RE_3 are said to be *regular isotopic*. The notation $A \overset{R}{\sim} B$, where A and B are link diagrams, is used to say that A and B are regular isotopic. Note that regular isotopic diagrams are always ambient isotopic,

$$A \overset{R}{\sim} B \implies A \overset{A}{\sim} B,$$

while the converse is not always true. Observe that the regular isotopic relation between link diagrams defines an equivalence relation on the set of link diagrams. This relation is called *regular isotopy*.

Link diagrams interpreted as *blackboard framed links*, as we will see later, is a presentation for spaces (*i.e.* connected, compact, oriented 3-manifolds). This connection is essential to the contribution of this work: a prime space catalog of small BFLs or blinks.

Type

Figure 2.6 Reidemeister moves

2.3 Linking number, writhe and linking matrix

A link is said *oriented* if all its components have an *orientation*. There are two possible orientations for each component. So, a link with k components can be oriented in 2^k different ways. To present an oriented link we can draw the link diagram with one arrow on each component indicating its orientation. For example, Figure 2.7A shows an oriented trefoil. A crossing on an oriented link diagram may be of two types as Figure 2.7C shows. Each of these types has a number +1 or -1 which is called the *sign of the (oriented) crossing*. When the undercrossing line, on its orientation sees the overcrossing line go from left to right then the sign is +1, else, if it sees the overcrossing line going right to left, the sign is -1.

Figure 2.7 Oriented links

Let D be an oriented link diagram of link L. Let α be a component of L. The sum of the signs of auto-crossings of α (crossings of α with α) on D is said to be its *writhe* and is denoted

by $w(\alpha)$. For instance, the writhe of the only component of the oriented trefoil of Figure 2.7A is +3, because all 3 crossing are auto-crossings and with sign +1. Note that changing the orientation of a component does not change its writhe. Now, let α and β be two components of a link L. The sum of the signs of the crossings on D of components α and β is said to be its *linking number* and is denoted by $\ell k(\alpha,\beta)$. For instance, on Figure 2.7B, the linking number of α and β is -2 as the two crossings are -1.

Let D be an oriented link diagram with components α_1,α_2,..., α_n. The *linking matrix* of D is given by

$$\begin{pmatrix} w(\alpha_1) & \ell k(\alpha_1,\alpha 2) & \cdots & \ell k(\alpha_1,\alpha_n) \\ \ell k(\alpha_2,\alpha_1) & w(\alpha_2) & \cdots & \ell k(\alpha_2,\alpha_n) \\ \vdots & \vdots & \ddots & \vdots \\ \ell k(\alpha_n,\alpha_1) & \ell k(\alpha_n,\alpha_2) & \cdots & w(\alpha_n) \end{pmatrix}$$

From this matrix, as we will see in Section 3.4, it is possible to obtain a space invariant: the homology group. But to understand this we must first understand what a link diagram has to do with spaces. This is the theme of next section.

2.4 Framed links and blackboard framed links: encoding spaces

This section presents a fundamental result for this work. To get deep into this result's justification ideas would demand a lot of work not needed for our aim. But to get a good image of this result's meaning is easier. Let's get it.

Consider the unknot on $\mathbb{S}^3$, *i.e.* a ring floating inside the 3-dimensional sphere. Now imagine a small tubular volume T, centered on this unknot. In this situation one could ask: is there a way to replace the interior of this tubular volume T with something different? Of course there is. We could replace T by "nothing", leading to the "shape" of $\mathbb{S}^3$ with a toroidal hole in it. Although this is a correct thought, it is not what we are imagining here. We would like to replace T with something different, but not leaving a hole. In this case, is there something different of

"replacing T by T"? The answer is also yes [2]. We can replace T by another volume that fills in the hole and leads to a closed 3-manifold different from $\mathbb{S}^3$. In fact, this idea generalizes.

Let's call a replacement like the one we mentioned above by *surgery*. Think of a link on $\mathbb{S}^3$ and a thin tubular volume T_i centered on each of its components. By analogy with the simple unknot case above, it is easy to note the possibility of obtaining different closed 3-manifolds by different surgeries (*i.e.* replacement of the thin tubular volumes T_i). In fact, as Lickorish [**?**] and Wallace [**?**] proved independently, any closed, connected, oriented 3-manifold may be obtained by surgeries (the technical name is Denn surgeries) of a link on $\mathbb{S}^3$. So, by doing valid replacements of the thin tubular volumes centered on the components of a link, one can obtain any closed, connected, oriented 3-manifold. This result is very important once shows an intrinsic connection between links (*i.e.* embeddings of circles into the 3-dimensional sphere $\mathbb{S}^1 \to \mathbb{S}^3$) with spaces (*i.e.* closed, connected, oriented 3-manifold).

The information that defines how to do the surgery on a component (replacement of the tubular volume centered on that component) is called *framing*. So, with a link and a framing for each of its component, a space is defined. A framing as is justified in Chapter 9 of [**?**] may be just an integer number. This leads to the definition we use of *framed link*: a link in $\mathbb{S}^3$ with an integer associated to each component. So, from a framed link it is possible to obtain a space. Start with the link, define the thin tubular volumes T_i centered on each component and, finally, apply the surgery on each T_i defined by the framing of component i.

In Section 2.2 we saw that a link diagram is a way to present a link. So, we can present framed links (spaces) by drawing a link diagram and writing an integer near each component: its framing. Although this is a nice way to present spaces, there is an even more concise way to do it based on two facts: (1) the writhe of a component, as is the framing of a component on a framed link, is an integer number associated to it on a link diagram; (2) by adding or removing one curl on a link diagram, application of one Reidemeister move I, one is able to, without modifying the link, increment by 1 or -1 the writhe of a component. Using these ideas we have the following result:

[2]For theory and examples of these replacements see [**?**].

given any framed link, it is possible to draw a link diagram
for it where the writhe of each component on the link diagram
is exactly the framing of the same component.

For example, suppose we want a link diagram for the trefoil with framing zero. See Figure 2.8. We first draw a link diagram for the trefoil. While the framing of the component is not equal to its writhe on the diagram, we add curls until they match. Note that adding these curls do not change the underlying link.

A *blackboard framed link* or *BFL* is a link diagram presentation of a space. The space is the space induced by a framed link defined by: (1) the link of the framed link is the link on the diagram; (2) the framing of each component equals to the writhe of the same component on the diagram. So, any link diagram may be seen as a blackboard framed link inducing a space and, also, any space has blackboard framed link presentation for it. One of the main aims of this work is to identify all prime spaces that have a "small blackboard framed link" inducing it.

HOW TO FILL THE TOROIDAL HOLES?

As we said, the framing tells how to close a toroidal hole in $\mathbb{S}^3$. But how is that done? Here is how. A hole is a solid torus embedded in $\mathbb{S}^3$. If the framing in zero, then define c as a curve on the surface of the hole (*i.e.* a solid torus) parallel to the curve that follows the center of the hole (see the black line in the left drawing of Figure 2.9). If the framing is $n \neq 0$ then define c the same way except that it does n twists on the surface of the hole before completing a loop (see the bottom drawing in Figure 2.9). To close the toroidal hole is a matter of doing an abstract gluing: identify curve c with the meridian curve of a torus as is shown by the "glue" arrow in Figure 2.9. With this identification a complete homeomorphism is defined between "the hole" and "the shape" that replaces it in a different way.

Figure 2.8 Aligning framing with writhe

toroidal hole in $\mathbf{S}^3$

Figure 2.9 Gluing a solid torus to a toroidal hole: BFL-component and meridian become the same

2.5 A calculus on blackboard framed links

When do two framed links induce the same space? Kirby, in [**?**], showed when. Fenn and Rourke [**?**] reformulated Kirby's ideas, and, from that point, Kauffman brought Kirby's result to the diagrammatic language of blackboard framed links. Figure 2.10 shows Kauffman's blackboard framed link formulation of Kirby's calculus (page 260 of [**?**]).

Some notes about Figure 2.10. The symbol $\overset{S}{\sim}$ between two blackboard framed links denotes that both BFLs induce the same space. When the symbol $\overset{S}{\sim}$ is used between two detached pieces of blackboard framed links (the correspondence on the boundary of these pieces must exist and should be easily identifiable as in Figure 2.10) it means that exchanging these pieces on any blackboard framed link do not change the induced space. Move K_0 states that we can create or eliminate disjoint knots in form of ∞ as we wish, that the induced space does not change. Note that there is no K_1. We reserved this label for a move shown later. Moves K_2 and K_3 are, respectively, Reidemeister moves RE_2 and RE_3. So, regular isotopic blackboard framed links (this relation is also defined for BFL, once BFLs are link diagrams) induce the

Figure 2.10 Kauffman's blackboard framed link formulation of Kirby's calculus

same space,

$$A \overset{R}{\sim} B \implies A \overset{S}{\sim} B,$$

because there is a finite sequence of moves in $\{K_2, K_3\}$ connecting them. Moves K_4 and K_5 are actually a family of infinite moves indexed by a parameter $n \in \mathbb{N}$.

Kauffman's reformulation of Kirby's result states that

if A and B are blackboard framed links, then A and B induce the same space if and only if applying a finite sequence of moves in $\{K_0, K_2, K_3, K_4(n), K_5(n)\}$ *one can transform A into B.*

As an application of this result, see Figure 2.11. All drawings are blackboard framed link versions of the same space as they are all connected by a finite sequence of moves in $\{K_0, K_2, K_3, K_4(n), K_5(n)\}$. One can verify, by applying the surgeries on $\mathbb{S}^3$ defined by each of these BFL's, that the resulting space is $\mathbb{S}^2 \times \mathbb{S}^1$ (See [**?**]).

We denote by $\mathscr{K}^0$ Kauffman's set of moves or axioms on Figure 2.10:

$$\mathscr{K}^0 = \{K_0, K_2, K_3, K_4(n), K_5(n)\}.$$

We reserve the remainder of this section to show that the move defined on Figure 2.12, called the *ribbon move*, and denoted by K_1, can replace the infinite class of moves $K_5(n)$ on $\mathscr{K}^0$ leading to a simpler and equivalent calculus $\mathscr{K}^1$. Let's start by showing that the ribbon move is a consequence of $\mathscr{K}^0$. But, before, we need a simple lemma.

Lemma 2.5.1 (Whitney trick)**.** *Blackboard framed links that differ by the pieces below are regular isotopic, so they induce the same space.*

Figure 2.11 Example of BFL's inducing the same space: $\mathbb{S}^2 \times \mathbb{S}^1$

Figure 2.12 The *ribbon move* or K_1

Proof. The four forms of this lemma are obtained by combined reflections on the x and y axis of transformation

.

Note that each passage is a regular isotopy move in $\{K_2, K_3\}$. $\square$

Proposition 2.5.2. *The ribbon move follows from $\mathscr{K}^0$. More specifically, from Whitney trick and the $n = 1$ version of axiom K_5.*

Proof. The following picture speaks by itself.

R
Whitney
Trick
S
Axiom K5
(n=1)

□

To show that K_1 actually can replace $K_5(n)$ it remains to prove that with the remaining moves and K_1 (*i.e.* moves in$(\mathscr{K}^0 \setminus \{K_5(n)\}) \cup \{K_1\}$), we can reproduce $K_5(n)$, for any n. Before doing this, we define some notation and show some necessary results.

Figure 2.13A shows a thick cable with an n near it. This notation is a shortcut for n parallel thin lines (the ones we have been using). Figure 2.13B shows a thick cable with an n near it doing a curl. This notation is a shortcut for n parallel lines doing a curl and respecting the crossings as is shown. When a thicker cable appears without an n and thin cables appear on the same link diagram, the n is implicit for the thicker cable. Figure 2.13C shows the definition of a $+2\pi$ *twist box* and of a -2π *twist box* both with *size* equals 4 (number of "inputs"). The extension of this definition for any size ≥ 2 is immediate.

Now we show the last result before proving that K_1 may replace $K_5(n)$. This result uses the $\pm 2\pi$ twist boxes notation that we defined earlier.

Lemma 2.5.3. *Regular isotopy leads to*

Figure 2.13 Some notation

+2π
R̃
=
u

Proof. Generalization of the following case where $n = 3$.

□

Lemma 2.5.4. *Regular isotopy alone is capable of simplifying the left configuration below with $2i^2$ crossings down to the right one with $2i$ crossings.*

Proof. This proof is taken from [**?**].

□

Theorem 2.5.5. *The ribbon move K_1 together with regular isotopy moves K_2 and K_3 implies move $K_5(n)$.*

Proof. Follow this text and the figure below. We begin with the left side of K_5 move. The passage (1) is the application of Lemma 2.5.4. The passage number (2) is the application of ribbon moves on the bottom curl of each strand. The passage number (3) is the application of Lemma 2.5.1 (Whitney trick) on each strand. The rightmost image is the right side of move K_5, so the theorem is proved.

□

Now we present Figure 2.14 that shows together all moves of $\mathscr{K}^1$ calculus:

$$\mathscr{K}^1 = \{K_0, K_1, K_2, K_3, K_4(n)\}.$$

Two BFLs induce the same space if and only if there is a finite sequence of moves in $\{K_0, K_1, K_2, K_3, K_4(n)\}$ transforming one BFL into the other.

Figure 2.14 BFL calculus $\mathscr{K}^1$, obtained by replacing $K_5(n)$ by K_1 (ribbon move)

We end this section with some results that are consequence of BFL calculus.

Lemma 2.5.6 (Passing Wall Lemma)**.** *These patterns are all regular isotopic*

R
R

Proof. This is just the idea: start passing the horizontal curve under xor (*i.e.* exclusive or) over all the crossings of the white ball using the moves K_2 and K_3. □

Lemma 2.5.7 (Passing Cross Lemma)**.** *The first two and last two patterns are all regular isotopic*

R
R

Proof. Follow the picture below. It proves that the first two patterns of this lemma are regular isotopic. On the passage (1) the pattern is rearranged to show the structure of the Passing Wall Lemma. On passage (2) this lemma is applied. On passage (3) we use the regular isotopy basic move K_3 and rearrange its result on passage (4), arriving at the pattern wanted. The proof for the last two pattern is analogous to this one.

(1)
R
(2)
R
(3)
R
(4)
R

□

Lemma 2.5.8 (Jumping Rope Lemma)**.** *The following patterns induces the same space.*

S
S

Proof. Follow the picture below. It proves that the first two patterns of this lemma induce the same space. On the passage (1) the pattern is rearranged to show the structure of the Passing Wall Lemma. On passage (2) this lemma is applied. On passage (3) we just rearrange the pattern to stress the two curls on the different sides of the cable. On passage (4) the Passing Cross Lemma is repeatedly applied until the right curl traverse all the cable. On passage (5) the ribbon move is applied. Finally, the Whitney trick is used on passage (6). We have thus proved that the first two patterns of this lemma indeed induce the same space. From these s.pdf it is clear how the last pattern of this lemma is also proved to induce the same.

(1)
(2)
(3)
(4)
(5)
(6)
R
R
R
R
S
R

□

CHAPTER 3

Blinks

3.1 From blackboard framed links to blinks

In Section 2.4 we saw that a blackboard framed link or BFL is a link diagram that induces a space. We now describe a procedure to build a new object from a blackboard framed link.

Follow the s.pdf described in this paragraph on the example of Figure 3.1. Start with a BFL (Figure 3.1A). We say that two faces on a BFL are *adjacent* if they share a curve (not just a point) that separates them. The faces of a BFL can be colored black or white such that no two adjacent faces have the same color. To do this first define all faces as *unassigned*: no color. Then assign white to the external face of the BFL. Then repeat this: assign white a face that is adjacent to a black face or assign black a face that is adjacent to a white face, until all faces are assigned white or black. This procedure always leads to a unique coloring. Figure 3.1B shows the resulting color assignment of the BFL of Figure 3.1A with the black faces painted in gray and white faces painted white. The next step is to classify each crossing of the BFL as *red* or *green* (Figure 3.1C). A crossing is *red* if the overcrossing line, on the clockwise direction, separates a black face from a white face. A crossing is *green* if the overcrossing line, on the clockwise direction, separates a white face from a black face. Now choose one interior point on each black face as shown in Figure 3.1D. For each crossing c, let A and B be the chosen interior points of the two black faces involved in c. Draw a simple curve from A to B such that: (1) it passes through the crossing point of c; (2) all of its points are black region points or the crossing point of c; (3) its points that are not end-points do not intersect any other crossing curve. Note that A and B can be the same point. In this case the curve is a *loop*. Figure 3.1E shows the result after drawing all such curves. Figure 3.1F shows the new object after erasing the underlying BFL that guided its construction. This resulting object is named a *blink* and its

Figure 3.1 Procedure BFL2BLINK

general definition is a plane graph with each edge colored either red or green. Note that a blink may have loops and multiple edges. Each chosen point on each black face is called a *blink vertex* and each simple curve is called a *blink edge*. The *size of a blink* is its number of edges. The blink on Figure 3.1F has size equal to 9.

We name the procedure described in last paragraph as BFL2BLINK. It is always possible to apply it in backwards and obtain a blackboard framed link from a blink. So the BFL2BLINK when applied in backwards becomes the BLINK2BFL procedure. A blink and a BFL related by the BFL2BLINK or the BLINK2BFL are said to be *associated*. So the BFL on Figure 3.1A and the blink on Figure 3.1F are associated.

Figure 3.2 Blinks

In a strict sense, all blinks on Figure 3.2 are different. Their edges are different curves, so, as plane graphs, they are different. But something connects all these blinks: there exists a plane isotopy from any of these blinks to any other. From now on, we say two *blinks are equal* if they

are "connected" by a plane isotopy, otherwise they are *different*. We use the same convention with blackboard framed links: we say two *BFLs are equal* if they are "connected" by a plane isotopy, otherwise they are *different*.

We now claim that all associated BFLs of a class of equivalent blinks (blinks connected by a plane isotopy) are also connected by a plane isotopy and vice-versa. So everything fits together and we may think of a blink as a class of equal blinks and a BFL as a class of equivalent BFLs. In this sense, a blink (the whole class of equivalence) is associated to only one BFL (the whole class of equivalence). By Proposition 3.1.1 we know that a BFL (the whole class) induces only one space. This allows us to define the *space of a blink* (the whole class) as the space induced by the associated BFL.

Proposition 3.1.1. *If there is a plane isotopy between two blackboard framed links then they induce the same space.*

Proof. Every element involved in the space construction from a BFL is preserved under plane isotopy. □

3.2 A calculus for blinks

In Section 2.5 we presented two sets of blackboard framed link moves: $\mathscr{K}^0$ and $\mathscr{K}^1$. These sets have the strong property of connecting BFLs if and only if they induce the same space. Here we present a blink version of these sets: a set of blink moves named $\mathscr{B}$. Two blinks induce the same space if and only if there is a finite sequence of moves in $\mathscr{B}$ transforming one blink into the other. The main result of this section is the following Theorem:

Theorem 3.2.1. *Two blinks induce the same space if and only if they are connected by a finite sequence of moves, where each one of them is one of the ones displayed in Figure 3.3, or its red/green twin.*

Some explanation on Figure 3.3 is in order. The portion of the blinks which are altered is depicted in an open disk named a *coin*. The interior of the coins modifies precisely as indicated. The vertices interior to a coin are displayed as small black circles. The intersection of the blink with the complement of the coin is a subset of vertices, the *attachment* vertices displayed as small white circles. In this way a point in the interior of an edge of the blink is either inside or else outside the coin. We allow arbitrary identifications in the attachment vertices via deformations of the coins so as to preserve their interiors (as long as they preserve planarity).

In $\mathscr{B}$ there are four simple moves twins: B_0, B_1, B_2, B_3, and an infinite family $B_4(1) = M_1$, $B_4(2) = M_2$, $B_4(3) = M_3$, $\ldots$, named the *maple leaf moves*, $B_4(n) = M_n$. By an abuse of notation, each move B_i, $(i = 0,1,2,3)$ or M_n, $n \in \mathbb{N}$, denotes either the move depicted in Figure 3.3 or its red/green twin.

The maple leaf move M_n is the manifestation in the blink of the move μ'_n on BFLs treated in the subsection which follows the next one. Move μ'_n will replace move α_n which is another name for move $K_4(n)$ shown on Figure 2.14. We stress the point that the set of axioms in the above formal $\mathscr{L}$-calculus is a minimal one. For instance, we anticipate the fact that a move obtained from a move in $\mathscr{B}$ by taking planar duals of the blinks is a consequence of $\mathscr{B}$.

Figure 3.3 Blink formal calculus by local coins replacements

In BFLs, μ_n is equivalent to α_n

We now show that the α_n axiom on BFLs can be replaced by a new axiom: μ_n. This is useful because the number of crossings involved in μ_n is linear on n while in α_n is quadratic. The axiom μ_1 is defined to coincide with α_1. For $n > 1$, μ_n is defined by Figure 3.4.

Figure 3.4 Definition of μ_n, $n \geq 2$.

Lemma 3.2.2. *The heart-shape smoothing move depicted below is obtained regular isotopies, and a single ribbon move.*

Proof. Follow the proof in the figure below. The ribbon move is used in the second configuration to prepare for the application of Whitney´s trick. After this is done we obtain the third configuration. All other moves are regular isotopies.

□

Lemma 3.2.3. *The move μ_n does not change the induced space.*

Proof. The proof is done for a class of moves that generalizes μ_n, depicted in Fig. 3.5. The white circle separating the cable of $n-1$ parallel strands means that the $2(n-1)$ individual strands in its boundary are paired arbitrarily (maintaining planarity, of course). The precise undercrossings and overcrossings of the individual strands in the cable are also arbitrary and are left undisplayed: we indicate this by a real crossing between the thick line and the thinner ones. The first passage from the first to the second configuration, is a Kirby handle slide (page

Figure 3.5 Moves that generalize μ_n.

122 of [**?**]) obtained by doubling the ∞-shaped component and performing the connected sum at the external encircling component. Note that (irrespectively of the individual crossings not shown) the third configuration is reachable from the second by Reidemeister moves of type II because consecutive crossings along the individual strands inside the cable are both over or both under. The third passage is a consequence of the heart-smoothing move of Lemma 3.2.2 $\square$

Lemma 3.2.4. *$\mu_1, \mu_2, \mu_3, \ldots \Rightarrow \alpha_n$ for all $n \geq 1$. In words: if you have the infinite sequence of moves $\mu_1, \mu_2, \ldots$ then you can reproduce α_n for any $n \geq 1$.*

Proof. By induction on n. It is obvious that we have α_1 from $\mu_1, \mu_2, \mu_3, \ldots$ once, by definition, $\alpha_1 = \mu_1$. Suppose we have how to reproduce α_i from $\mu_1, \mu_2, \ldots$ for all $i < n$. Then, for n, as can be seen on the Figure below, we can apply the induction hypothesis on the internal $n-1$ strands of the curl and then apply the μ_n, thus obtaining α_n.

□

In BFLs, μ_n is equivalent to μ'_n

By replacing α_n with μ_n we have simplified our axioms in the sense that μ_n has fewer crossings than α_n. But, before translating our axiom system on blackboard framed links to the blink language, we define the move μ'_n that is equivalent to μ_n but has a "better" translation to blinks. The axiom μ'_1 is equal to μ_1. For $n \geq 2$, μ'_n is defined by the schema on Figure 3.6.

Figure 3.6 The axiom μ'_n $(n \geq 2)$: "better" blink translation than μ_n

Proposition 3.2.5. *(Regular isotopy and μ'_n)* $\Rightarrow \mu_n$, *for* $n \geq 1$.

Proof. For $n = 1$ it is obvious because $\mu_1 = \mu'_1$. The figure below shows the proof for $n = 2$. Beginning with the right side of μ_2 we apply regular isotopy (*i.e* moves K_2 and K_3) until we get to a pattern where μ'_2 can be applied (the second pattern on the second line). We apply it and then use again regular isotopy to get to the pattern of the left side of the μ_2 axiom. As all these transformations are both ways, we have proved the case for $n = 2$. The proof for $n > 2$ is analogous to the $n = 2$ case and will not be shown.

□

TRANSLATION OF BLACKBOARD FRAMED LINK CALCULUS TO BLINK CALCULUS

The translation from $\mathscr{K}$ into $\mathscr{B}$ is depicted in Figure 3.7.

Proof. (of Theorem 3.2.1.) The proof is a direct translation of the moves $K_0, \ldots, K_3$ and $\mu'(1), \ldots \mu'_n, \ldots$, into the moves $B_0, \ldots B_3$, and $M_1, \ldots K_n, \ldots$ □

Translation of K_0 into B_0 Translation of the ribbon m B_1

Translation of K_2 into B_2 Translation of K

Translation of u' u' into M M

3.3 g-blinks

Let B be a blink. We now describe a procedure to define, from B, a 4-regular graph G_B named a *g-blink*. This procedure is called BLINK2GBLINK and associates to any blink (topological object) a unique g-blink (combinatorial object). Let u be a vertex of B and $e_0, \ldots, e_{\delta_u - 1}$ be the edges incident to u ordered in clockwise direction (e_0 may be any edge). For each edge e_i with $i \in \{0, \ldots, \delta_u - 1\}$ we define two vertices in G_B: one labeled $(u, e_i, 2i)$ positioned close to e_i but before it in clockwise direction; the other is labeled $(u, e_i, 2i+1)$ positioned close to e_i but after it in clockwise direction (see Figure 3.8A). If $(u, e, 2j)$ and $(u, e, 2j+1)$ are vertices of G_B then they are the ends of a *face-edge* of G_B (Figure 3.8B). If $(u, e, 2j+1)$ and $(u, f, 2j+2 \bmod 2\delta_u)$ are vertices in G_B then they are the ends of a *angle-edge* in G_B (Figure 3.8B). If (u, e, j) and (v, e, k) are vertices in G_B and the parity of j is different from the parity of k then they are the ends of a *vertex-edge* of G_B (Figure 3.8C). If (u, e, j) and (v, e, k) are vertices in G_B and the parity of j is equal to the parity of k then they are the ends of a *zigzag-edge* of G_B (Figure 3.8D).

We define a bipartition V_0 and V_1 of the vertices of G_B like this: a vertex v labeled with $(_, _, 2j)$, for some integer j, is said to be a *parity zero vertex* and it is in V_0; a vertex v labeled with $(_, _, 2j+1)$, for some integer j, is said to be a *parity one vertex* and it is in V_1. On the example of Figure 3.9 V_0 are the white vertices and V_1 are the black vertices.

If B has n edges, then G_B has $4n$ vertices and $8n$ edges. Each vertex of G_B has degree 4 and is incident to a face-edge, an angle-edge, a vertex-edge and a zigzag-edge. If v is a vertex in G_B we denote by $\mathrm{adj}_v(v)$, $\mathrm{adj}_f(v)$, $\mathrm{adj}_a(v)$ and $\mathrm{adj}_z(v)$ the vertices adjacent to v by vertex-edge, face-edge, angle-edge and zigzag-edge respectively.

A *g-edge* is a polygon on a g-blink whose edges alternate between face-edges and vertex-edges (Figure 3.9H). A g-edge has always 4 edges and 4 vertices and is associated to an edge on a blink (note that the vertices of a g-edge are of the form $(_, e, _)$). If the corresponding blink edge of a g-edge is red then this g-edge is also red. If the corresponding blink edge of a g-edge is green then this g-edge is also green. A *g-face* of a g-blink is any polygon with

e4
e0
9
8
0
1
(u,e,2)
e3
7
2
6
u
3
e1
5
4
(u,e,3)
e2
(A)
f
a
f
a
a
f
u
f
a
f
a
(B)
a
v
a
f
f
e
v
a
a
(C)
a
z
z
a
f
f
e
a
a
(D)

Figure 3.9 Blink, g-blink and attributes: an example

vertex-edge alternated with angle-edge (Figure 3.9I). Each of these polygons corresponds to a face of the blink. A *g-vertex* of a g-blink is any polygon with face-edge alternated with angle-edge (Figure 3.9J). Each of these polygons corresponds to a vertex of the blink. A *g-zigzag* of a g-blink is any polygon with angle-edge alternated with zigzag-edge (Figure 3.9K). Each of these polygons corresponds to a component on the blackboard framed link associated with the blink.

Now, using the notation defined above, we state a definition for *g-blink*. A *g-blink* is a graph that satisfies the following six conditions:

(1) Its vertices are partitioned in V_0 and V_1 (white and black vertices of Figures 3.8 and 3.9);

(2) vertices in V_0 are adjacent by face-edge, vertex-edge and angle-edge to vertices in V_1 and by zigzag-edges to vertices in V_0; vertices in V_1 are adjacent by face-edge, vertex-edge and angle-edge to vertices in V_0 and by zigzag-edges to vertices in V_1;

(3) each vertex is incident to exactly one face-edge, one vertex-edge, one angle-edge and one zigzag-edge;

(4) each polygon of alternating face-edge and vertex-edge has 4 edges (is a g-edge) and is assigned color red or green (see the g-edges on Figure 3.9L) or, equivalently, a pair of zigzag edges of the same g-edge is labeled one edge as overcrossing and the other edge as undercrossing;

(5) the zigzag-edges are the diagonals of the g-edges connecting the vertices with the same parity. Observe that this implies that zigzag-edges are redundant when we know the g-edges. They may be omitted when presenting a g-blink and calculated or shown when needed. For example Figure 3.9L can be easily restored from Figure 3.10;

(6) the 3-regular graph obtained by not considering the zigzag edges is a planar graph (see Figure 3.10).

It is important to note that a g-blink is a combinatorial object, although, to visualize the connection with blinks, we show drawings of g-blinks where edges are curves and vertices are points. These drawings are just to help visualization. The g-blink relevant information is

Figure 3.10 g-blink of Figure 3.9L without zigzag-edges: a planar graph

combinatorial: a set of vertices, the neighbor of each vertex by each type of edge, the parity of the vertices and the color of the g-edges.

Note that the definition of g-blinks is independent of blinks. As we saw, it is a 4-regular graph with some additional structures and constraints. Now, with this observation in mind, consider the situation shown on Figure 3.11. The blinks of Figure 3.11A and Figure 3.11D are different in the strict sense (their plane graphs are different) but are different[1] in a looser sense also: there is no plane isotopy between these two blinks (we would have to tear the red loop on Figure 3.11A). On the other hand, their g-blinks are the same as can be seen on Figure 3.11C and Figure 3.11F (remember that the edges on g-blinks presented as drawings are important only to define who is the neighbor of who, their curve shape is not important).

To obtain a blink from a g-blink we must first embed (forgetting zigzag-edges) the g-blink on a plane respecting the convention we used on the procedure BLINK2GBLINK: the orientation of all g-vertices induced by orienting the face-edges from white (parity 0 vertex) to black (parity 1 vertex) is always clockwise. Let's name this convention as *convention* $\circlearrowright$. The embedding part is always possible once a g-blink without zigzag-edges is a planar graph. It is always

[1]When referring to blinks, this looser sense concept of "difference" is the one we adopted as our convention on Section 3.1. We could just say the blink of Figure 3.11A and the blink of Figure 3.11D are different.

Figure 3.11 Different blinks with the same g-blink

possible to satisfy convention $\circlearrowright$. For example, if all g-vertices are counterclockwise we may reflect horizontally or vertically all the embedding correcting the situation. If all g-vertices are correct except for the external g-vertex (which is the external face in this case) then we may redraw the curve of an external angle-edge making it go around all the embedding (see edge e for an example of this on Figure 3.19). If a blink B is obtained from a g-blink G then we say that G induces B.

What are the blinks induced by a g-blink? We must answer this to continue. Name A the blink of Figure 3.11A and B the blink on Figure 3.11D. We know there is no plane isotopy between A and B. But A and B are both obtainable from the same g-blink as Figure 3.11 shows. How could we connect A and B? The answer is shown on Figure 3.12. On the sphere $\mathbb{S}^2$ there is an isotopy between A and B. One can check that blinks obtainable from a g-blink are blinks that when embedded on a sphere (draw it on the plane and then use stereographic projection to get this embedding) may be transformed one into the other by an isotopy of the sphere.

Do the blinks obtainable from a g-blink induce the same space? Once we are, at the end, interested in spaces, g-blink would not be a useful object if its blinks induced different spaces. The answer is yes. All blinks of a g-blink induce the same space. The reason is the Blink Jumping Rope Lemma 3.3.1. Note how this Lemma is exactly what is needed to prove that the blinks of Figure 3.11A and Figure 3.11D induce the same space.

Figure 3.12 Isotopy on the sphere $\mathbb{S}^2$

Lemma 3.3.1 (Blink Jumping Rope Lemma)**.** *The (meta-)blinks shown below induce the same space.*

Proof. Follow the figure below. First we show the BFL associated with the left blink (the crossing correspondent to red edge). Then we apply the Jumping Rope Lemma 2.5.8 for BFLs and regular isotopy to get to our target blink. As our moves preserve the space, we have the result.

□

With this last result we now define the *space of a g-blink* as the space induced by any blink induced by the g-blink. As we saw, this space is unique. Observe that the blinks induced by a g-blink are divided into $|F|$ plane isotopy classes, where F is the set of g-faces of the g-blink. For each g-face $f \in F$ there is a blink which has the face corresponding to f as its external face. So, not considering symmetries that may occur, each g-blink corresponds to $|F|$ distinct blinks.

Although our initial motivation was to work with blinks, in practice we did this indirectly through g-blinks. It turned out that this was more adequate once g-blinks are simpler (*i.e.* to encode a single blink we would have to have the current g-blink information plus an extra one: which g-face is the external one), more expressive (*e.g.* one g-blink actually encodes $|F|$ blinks that induce the same space) and we could prove a set of g-blink interesting properties that enabled us to do the experiments we wanted (*e.g.* find all distinct spaces that had a small blink/BFL/g-blink presentation).

Before ending this section, one last observation: note that a single g-blink also encodes $|F|$ BFLs: the ones obtained from the $|F|$ blinks by the BLINK2BFL procedure. So we may see a g-blink through $|F|$ blink views and through $|F|$ BFL views.

3.4 Homology group from g-blink

The homology group is a topological invariant obtained from the abelianization of the fundamental group. It is easy to obtain a presentation of the fundamental group from a blackboard framed link. However, the problem of deciding if two presentations of a group are isomorphic is an undecidable problem. This does not occur with the homology group. It is presented as a pair (b,t), where b is the *Betti number* and $t = (t_1,\ldots,t_p)$ is a sequence with $p \geq 0$. Each t_i in t is called the i-th torsion coefficient. This sequence also satisfies: $t_1 \geq 2$, if $p > 0$ and t_i divides t_{i+1} for $i < p$. The homology group (b,t) may be obtained from the Smith Normal Form of the linking matrix of a BFL (see [**?**] for definition and how to obtain this normal form). This is so because the linking matrix is a relation matrix for the homology group. The number of zeros in this diagonal is the Betti number b and appear all at the end. Throw away the entries equal to 1. The torsion coefficients $t = (t_1,\ldots,t_p)$ are the other entries on the diagonal. The remainder of this section shows how to calculate the linking matrix from a g-blink.

Let $Z = \{z_1,\ldots,z_k\}$ be the set of g-zigzags of the g-blink G. So every z in Z is a polygon with alternating zigzag-edges and angle-edges. We want to define a matrix N of dimension $k \times k$. First we orient each g-zigzag z in Z. This can be done by mounting a list $v_1,\ldots,v_m$ of the vertices of z such that v_i is adjacent to v_{i+1} by an edge in z, v_m is adjacent to v_1 by an edge in z and the orientation of the edges in z is defined by the way its end vertices appear in the list: the edge of z between v_i and v_{i+1} is oriented from v_i to v_{i+1} for $1 \leq i \leq m-1$ and the edge of z whose ends are v_1 and v_m is oriented from v_m to v_1. Initialize all entries of N with zero. For each g-edge a, let u and v be vertices in a such that: u has parity zero (in V_0 or white); v has parity one (in V_1 or black); z_i is the g-zigzag incident to u; z_j is the g-zigzag incident to v; the zigzag-edge in z_i incident to u and u' is oriented this way from u to u'; the zigzag-edge in z_j incident to v and v' is oriented this way from v to v'. Aligning each g-edge a to this standard leads to one of the situation shown in Figure 3.13 where the sign s_a of a is also shown. If a is green and u is adjacent to v by a face-edge then $s_a = +1$ (Figure 3.13A). If a is red and u is adjacent to v by a face-edge then $s_a = -1$ (Figure 3.13B). If a is green and u is adjacent to v by a vertex-edge then $s_a = -1$ (Figure 3.13C). If a is red and u is adjacent to v by a vertex-edge

then $s_a = +1$ (Figure 3.13D).

Figure 3.13 Signs of a g-edge a for the linking matrix

Knowing the sign of a we update N by

$$N_{i,j} \leftarrow N_{i,j} + s_a$$

and, if $i \neq j$, we also do

$$N_{j,i} \leftarrow N_{j,i} + s_a.$$

Note that N is symmetric. Once N is defined, to calculate the homology group is to calculate the Smith Normal Form of N and then collect the pair (b,t) as was already described above.

3.5 Quantum invariant from g-blink

In this section we show how to calculate the Witten-Reshetikhin-Turaev quantum invariant for a space from a g-blink inducing it. This calculation is a translation to g-blinks of the one showed on [**?**] that operates over blackboard framed links. For further details for this invariant see [**?**].

The Witten-Reshetikhin-Turaev invariant for a space M is a function $\mathrm{wrt}_M : \{3,4,\ldots\} \to \mathbb{C}$. This function maps every integer $i \geq 3$ into a complex number $\mathrm{wrt}_\mathrm{M}(i) \in \mathbb{C}$. If two spaces A and B satisfy $\mathrm{wrt}_A(i) \neq \mathrm{wrt}_B(i)$ for some i then A and B are different spaces.

Let M be a space and $r \geq 3$ an integer for which we want to obtain $\mathrm{wrt}_M(r)$. Let $\mathscr{I} = \{0,1,\ldots,r-2\}$. Let A be a $(4r)$-primitive-root of 1. For $n \in \mathscr{I}$ define

$$\Delta_n = (-1)^n \frac{A^{2n+2} - A^{-2n-2}}{A^2 - A^{-2}},$$

$$[n] = \frac{A^{2n} - A^{-2n}}{A^2 - A^{-2}} = (-1)^{n-1}\Delta_{n-1}\,.$$

Define $q = A^2$ and, for reasons inherited from physics, call $[n]$ by *q-deformed quantum integer* and

$$[n]! = \prod_{1 \leq m \leq n} [m]$$

by *q-deformed quantum factorial.* Note that although A is a complex number, Δ_n and $[n]$ are real numbers. Three numbers $a,b,c \in \mathscr{I}$ are said to be an *r-admissible triple* if $a+b+c \leq 2r-4$ and the numbers $a+b-c$, $b+c-a$, $c+a-b$ are non-negative even numbers.

Let F be the set of g-faces of G_B, V the set of g-vertices of G_B and Z the set of g-zigzags of G_B. Let $E_a[G_B]$ denote the angle-edges of G_B. Let $x : F \cup V \cup Z \to \mathscr{I}$ be a function that maps an integer in $\mathscr{I}$ for each g-face, g-vertex and g-zigzag of G_B. We define $x_i = x(i)$ for i in the domain of x. We say that function x is a *state.* Denote by $\mathscr{X}$ all possible states. Note that $\mathscr{X}$ is finite. For every state x exists a complex number c_x defined by (α and β are defined after):

$$c_x = \left(\prod_{f \in F} x_f\right)\left(\prod_{v \in V} x_v\right)\left(\prod_{z \in Z} x_z\right)\left(\prod_{a \in E_a[G_B]} \alpha(a,x)\right)\left(\prod_{e \in E[B]} \beta(e,x)\right).$$

The value of function raw for space M at integer r is the sum of c_x for every possible state x

$$\mathrm{raw}_M(r) = \sum_{x \in \mathscr{X}} c_x.$$

Now the missing elements: α and β. Starting with α. An angle-edge a may have a drawing like the one shown in Figure 3.14A. Note that the angle-edge a belongs to one g-face f, one g-vertex v and one g-zigzag z. Then we define

$$\alpha(a,x) = \frac{1}{\theta(x_f, x_v, x_z)}.$$

The function θ is defined as

$$\theta(a,b,c) = \begin{cases} \dfrac{(-1)^{m+n+p}[m+n+p+1]![n]![m]![p]!}{[m+n]![n+p]![p+m]!}, & \text{if } (a,b,c) \text{ is } r\text{-admissible;} \\ 0, & \text{otherwise;} \end{cases}$$

where $m = (a+b-c)/2$, $n = (b+c-a)/2$, $p = (c+a-b)/2$.

An edge e of the blink B corresponds in G_B to a schema like the one on Figure 3.14B. In this situation, the elements involved are the g-vertices v_1 and v_2, the g-faces f_1 and f_2 and the g-zigzags z_1 and z_2. It is always possible, for every edge e, to draw a schema like this and follow this standard: the angle-edges of z_1 that appear on the schema fall between v_1 and f_1 in one side and between v_2 and f_2 on the other side. We now define

$$\beta(e,x) = \begin{cases} \dfrac{\mathrm{Tet}(x_{f_1}, x_{v_1}, x_{f_2}, x_{v_2}, x_{z_2}, x_{z_1})\, \lambda(x_{f_1}, x_{z_1}, x_{v_1})}{\lambda(x_{v_2}, x_{z_1}, x_{f_2})}, & \text{if } e \text{ is green} \\ \dfrac{\mathrm{Tet}(x_{f_1}, x_{v_1}, x_{f_2}, x_{v_2}, x_{z_2}, x_{z_1})\, \lambda(x_{v_2}, x_{z_1}, x_{f_2})}{\lambda(x_{f_1}, x_{z_1}, x_{v_1})}, & \text{if } e \text{ is red} \end{cases},$$

where $\mathrm{Tet} : \mathscr{I}^6 \to \mathbb{R}$ is defined as

$$\mathrm{Tet}(a,b,c,d,e,f) = \frac{\mathrm{Int}!}{\mathrm{Ext}!} \sum_{m \le s \le M} \frac{(-1)^s [s+1]!}{\prod_{1 \le i \le 4} [s-a_i]! \prod_{1 \le j \le 3} [b_j - s]!},$$

z
v
a
f
(A)
z1
f1
z2
e
v1
v2
f2
z2
z1
(B)

in case the triples (a,b,f), (b,c,e), (c,d,f), (a,d,e) are r-admissible and considering

$$\begin{aligned}
\text{Int!} &= \prod_{\substack{1\le i\le 4\\ 1\le j\le 3}} [b_j - a_i]! \\
\text{Ext!} &= [a]![b]![c]![d]![e]![f]! \\
a_1 &= \tfrac{1}{2}(a+b+f) \qquad b_1 = \tfrac{1}{2}(b+d+e+f) \\
a_2 &= \tfrac{1}{2}(b+c+e) \qquad b_2 = \tfrac{1}{2}(a+c+e+f) \\
a_3 &= \tfrac{1}{2}(c+d+f) \qquad b_3 = \tfrac{1}{2}(a+b+c+d) \\
a_4 &= \tfrac{1}{2}(a+d+e) \qquad m = \max\{a_i\} \quad M = \min\{b_j\}.
\end{aligned}$$

In case any of the triples is not r-admissible, the value of Tet is zero. The function $\lambda : \mathscr{I}^3 \to \mathbb{C}$ is defined by

$$\lambda(a,b,c) = \begin{cases} (-1)^{(a+b-c)/2} A^{[a(a+2)+b(b+2)-c(c+2)]/2}, & \text{if } a,b,c \text{ is } r\text{-admissible;} \\ 0, & \text{otherwise.} \end{cases}$$

Finally, the function wrt_M is defined as

$$\mathrm{wrt}_M(r) = \frac{\mathrm{raw}_M(r)}{\mathrm{raw}_{S_1\times S_2}(r)}$$

Note that wrt is normalized by the raw values of the space $S_1 \times S_2$. The Figure 3.15 presents the values of the quantum invariant to the Poincaré Sphere, E, for $3 \le r \le 30$.

By playing with computation of the quantum invariants from various blinks we discovered a rather peculiar space.

Conjecture 3.5.1. *The quantum invariants of the space induced by the blink of Figure 3.16 are:* $q_r = \frac{2}{3}r$ *if* $r \equiv 0 \bmod 3$, $q_r = \frac{1}{3}(r+1)$ *if* $r \equiv 2 \bmod 3$, $q_r = \frac{1}{3}(r-1)$ *if* $r \equiv 1 \bmod 3$.

We have checked this result to a precision of 10 decimal places and up to $r = 45$. The fact that the quantum invariants are real is evident since the blink is red-green symmetric. The fact that they are all integer values and that every integer appears is rather pleasing.

r	$\mathrm{wrt}_E(r)$			ev	r	$\mathrm{wrt}_E(r)$			ev
3	0.7071067811	+	$0.0000000000i$	2	17	-0.7804263387	+	$0.1428530500i$	72
4	-0.5000000000	+	$0.0000000000i$	4	18	-0.0590950525	-	$0.7636697702i$	81
5	-0.3007504775	-	$0.9256147934i$	6	19	-0.1301847177	+	$0.3730119013i$	90
6	0.2886751346	+	$0.0000000000i$	9	20	-0.7085827791	-	$0.6254313947i$	100
7	-0.8460344491	-	$0.0447830425i$	12	21	0.3410488374	-	$0.1495290291i$	110
8	0.0000000000	-	$0.7325378163i$	16	22	-0.7854601781	+	$0.0248114386i$	121
9	-0.1761268770	+	$0.4020460816i$	20	23	0.0600389356	-	$0.7749612722i$	132
10	-0.7663118960	-	$0.5567581822i$	25	24	-0.1814470028	+	$0.3376768599i$	144
11	0.2998611170	-	$0.1557368892i$	30	25	-0.5895059790	-	$0.7441570346i$	156
12	-0.7886751345	+	$0.1830127018i$	36	26	0.3666499557	-	$0.0969412734i$	169
13	-0.1148609711	-	$0.7426524382i$	42	27	-0.7726037705	-	$0.1263662241i$	182
14	-0.1074423864	+	$0.3977522621i$	49	28	0.2079977942	-	$0.7581679950i$	196
15	-0.7770955704	-	$0.5344039501i$	56	29	-0.2393556663	+	$0.2887208942i$	210
16	0.3141711649	-	$0.1762214752i$	64	30	-0.4276587373	-	$0.8531721152i$	225

Figure 3.15 Example of quantum invariant: Poincarè's sphere

Figure 3.16 A peculiar space: its quantum invariants are integers and every integer appears

3.6 Code of a g-blink

In this section we are interested in defining a "word" with all information of a g-blink, one that from it we are able to rebuild the g-blink. This word is said to be the *code of the g-blink*. Let G be a g-blink. One of the ingredients to define this "code" is the GBLINKLABEL algorithm that labels the vertices of a g-blink from an initial vertex v (this initial vertex will be labeled 1).

When we talk about a *labeling of a g-blink or of a blink*, we are referring to a labeling of the vertices of the g-blink given by GBLINKLABEL with a starting vertex being some vertex with parity 1 in G. With this constraint, the set of vertices with even label defined by GBLINKLABEL

Algorithm 1 GBLINKLABEL(G, v)

```
S ← empty stack; i ← 1; ∀u, L_u ← ⊥                    ▷ ⊥ = not defined
push v into S
while S not empty do
    a ← pop S
    if L_a = ⊥ then
        b ← adj_f(a); c ← adj_v(b); d ← adj_v(a)
        L_a ← i; L_b ← i+1; L_c ← i+2; L_d ← i+3
        push adj_a(b) into S; push adj_a(d) into S
        i ← i+4
    end if
end while
return L
```

is exactly the set V_0 of G and the set of vertices with odd label is exactly the set V_1 of G. Other important properties of a labeling are: adjacent vertices by face, vertex or angle edges in G have labels with different parity; the vertices of the same g-edge have labels $4k-3$, $4k-2$, $4k-1$, $4k$ for some $k \geq 1$. From the label of a vertex it is possible to know the label of its neighbor by face, vertex and zigzag edge. For instance, if u has label $4k-2$ (for some integer $k \geq 1$) then its neighbor by face edge has label $4k-3$, by vertex edge has label $4k-1$ and by zigzag edge has label $4k$. One consequence of this fact is that it is possible to rebuild all edges of G annotating only the angle edge's neighbors, once the face edge, vertex edge and zigzag edge are all known from the vertex label.

Let L be a labeling for G. Let $a_1, a_2 \ldots, a_{4n}$ be the labels of the adjacent vertices by angle edges of the vertices $1, 2, \ldots, 4n$ under the L labeling. As we saw, this list is sufficient to restore the vertices and the edges of G. Note also that, by the property that adjacent vertices have labels with different parity, this list is made of even labels followed by odd labels and that if $a_i = j$, then $a_j = i$. From these two observations it follows that from $\frac{a_1}{2}, \frac{a_3}{2}, \ldots, \frac{a_{4n-1}}{2}$ it is possible to restore $a_1, a_2 \ldots, a_{4n}$ and, consequently, the vertices and edges of G. We denote the list (with labels divided by 2) as the *packed representation of L*. Note that the packed representation is a permutation of $1, \ldots, 2n$. If L is a labeling, we denote by PACK(L) the packed representation of L.

The Figure 3.17 presents a blink B, its induced g-blink G_B and the labeling resulted of GBLINKLABEL(G_B, v). In this case, the label of the adjacent vertices by angle edge of $1, \ldots, 24$

5
4
e2
6
3
e3
1
v
8
7
12
9
22
23
2
e1
e4
11
10
14
21
24
19
13
e5
15
18
e6
20
17
16

are $a_1, a_2, \ldots, a_{24} = 20, 23, 6, 5, 4, 3, 22, 9, 8, 13, 12, 11, 10, 21, 18, 17, 16, 15, 24, 1, 14, 7, 2, 19$. Its packed representation is $\frac{a_1}{2}, \frac{a_3}{2}, \ldots, \frac{a_{23}}{2} = 10, 3, 2, 11, 4, 6, 5, 9, 8, 12, 7, 1$.

We represent the bicoloration of the g-edges of a g-blink under the labeling L by the set of integers $\textsc{Reds}(G,L)$ defined this way: k is in $\textsc{Reds}(G,L)$ if g-edge with vertices $4k-3$, $4k-2$, $4k-1$ and $4k$ is red, otherwise k is not in $\textsc{Reds}(G,L)$.

Let L be a labeling for the g-blink G, then the *pre-code* of G for labeling L is the pair

$$(\textsc{Pack}(L), \textsc{Reds}(G,L)).$$

In the example of Figure 3.17, the edges e_1, e_2, e_3, e_4, e_5, e_6 are labeled with 3, 2, 1, 6, 4, 5 respectively. It follows that the *pre-code* for this blink under the presented labeling (starting at v, Figure 3.17) is:

$$((10,3,2,11,4,6,5,9,8,12,7,1),\{1,2,3\}).$$

It is easy to see that different labelings define different pre-codes and that the same blink may have different labelings by changing the vertex 1 on the procedure GBLINKLABEL. This creates a difficulty: two different pre-codes for the same g-blink. To resolve this we define the order relation $\preceq$ on the set of pre-codes. Let (π_1, R_1) and (π_2, R_2) be two pre-codes, then

$$(\pi_1, R_1) \preceq (\pi_2, R_2) \text{ if } \begin{cases} |\pi_1| < |\pi_2| \text{ or} \\ |\pi_1| = |\pi_2| \text{ and } \pi_1 < \pi_2 \text{ or} \\ \pi_1 = \pi_2 \text{ and } |R_1| < |R_2| \text{ or} \\ \pi_1 = \pi_2 \text{ and } R_1 = R_2 \text{ or} \\ \pi_1 = \pi_2 \text{ and } |R_1| = |R_2| \text{ and } \min(R_1 \backslash R_2) < \min(R_2 \backslash R_1), \end{cases}$$

where $|\pi|$ is the length of the permutation π and $|R|$ is the size of set R. The *code of the g-blink* G is its greatest pre-code under the relation $\preceq$:

$$\kappa(G) = \max_{\preceq} \left\{ (\textsc{Pack}(L_v), \textsc{Reds}(G,L_v)) \;\middle|\; \begin{array}{l} L_v = \textsc{GBlinkLabel}(G,v), \\ v \in V_1[G] \end{array} \right\}.$$

The *code of a blink* B is defined as $\kappa(B) = \kappa(G)$, where G is the induced g-blink of B. A labeling L of a g-blink is said to be a *code labeling of* G if $(\textsc{Pack}(L), \textsc{Reds}(G,L)) = \kappa(G)$. We extend the relation $\preceq$ on pre-codes to g-blinks and blinks in this natural way: g-blink G_1 *is smaller or equal to* g-blink G_2, $G_1 \preceq G_2$, if $\kappa(G_1) \preceq \kappa(G_2)$; blink B_1 *is smaller or equal to* blink B_2, $B_1 \preceq B_2$, if their induced g-blinks satisfy $G_1 \preceq G_2$.

3.7 DUAL, REFLECTION and REFDUAL of a g-blink

In this section we study the effects of simple changes on the structure of a g-blink. For instance, what happens to the induced space of a g-blink if we swap the parity of its vertices? And what happens to its blink presentations if we do this? We are interested in studying three types of modifications in the structure of a g-blink. One of them is swapping the parity of the vertices and we denote it by (P). Before naming the other two we establish the convention we use to encode g-blinks.

We saw in the definition of g-blinks that we may encode the red-green coloring of the g-edges directly or, alternatively, we may encode it by registering the overcross/undercross status of the zigzag-edges of each g-edge. In this section we assume that we are using this second alternative. So, here, the color of the g-edges is a consequence of the overcross/undercross state of the zigzag-edges of the g-blink.

Besides (P), the other two modifications in the structure of a g-blink that we study are: swapping the role of face-edges with vertex-edges, denoted by (FV); and swapping the overcrossing/undercrossing state of each zigzag-edge, denoted by (C).

The central blink in Figure 3.18 is a blink presentation for our reference g-blink. By applying all combinations of (P), (C) and (FV) on this g-blink we obtain new g-blinks inducing the blinks shown. We can learn from this figure the effects on blinks of these g-blink modifications. Applying (C), *i.e.* changing the undercross/overcross status on the zigzag-edges, the only effect is to swap the colors of the edges of the blinks; applying (P), *i.e.* changing the parity of the vertices, the effect is to do one reflection of the blink drawing and change the color of its edges; applying (C) and (P), *i.e.* changing the undercross/overcross state of each zigzag-edge and the parity of the vertices, the effect is just a reflection of the blink drawing; applying (FV), *i.e.* swapping the roles of face-edge and vertex-edge, the blink becomes the dual of the original blink (the dual is in the sense of a dual map or dual plane graph) whose dual edges preserve the same color as the original edges, followed by a reflection; applying (C) and (FV), *i.e.* swapping the roles of face-edge and vertex-edge and changing the overcross/undercross status of the

zigzag-edges, the effect is a dual blink wi
edge that "crosses" a red edge becomes a g
(FV) the effect is the dual blink with dual ed
"crosses" a red edge becomes a green one); ap
tions, the effect is the dual of the blink with the du
ones (*e.g.* a dual edge that crosses a green edge is itsel

Figure 3.18 The effect on blinks of applying all combinations of (C), (P) and (FV) on its g-blink

g-blinks) differing by the application of two distinct modifications have special names. If G is a g-blink, the g-blink obtained from G by applying (C) and (P) is said to be the *reflection* of G and is denoted by REFLECTION(G); the g-blink obtained from G by applying (C) and (FV) is said to be the *refdual* of G and is denoted by REFDUAL(G); the g-blink obtained from G

by applying (P) and (FV) is said to be the *dual* of G and is denoted by $\textsc{Dual}(G)$. They were shown in Figure 3.18 over a gray region because they all share one important property as the next proposition shows.

Proposition 3.7.1. *The spaces induced by g-blinks G,* REFLECTION(G), REFDUAL(G) *and* DUAL(G) *are the same.*

Proof. $(G \overset{S}{\sim} \text{DUAL}(G))$ – Consider the dual g-blinks on Figure 3.19A and Figure 3.19D. Following the drawings in each row of this figure we see how to obtain one induced BFL from a g-blink. Now observe that the BFLs on Figure 3.19C and Figure 3.19F induce the same space because we can get from one to the other by applying, on e, the space preserving move for BFLs of Lemma 2.5.8 (Jumping Rope Lemma for BFLs). It is easy to see that this argument generalizes to any pair G and DUAL(G), so $G \overset{S}{\sim} \text{DUAL}(G)$.

$(G \overset{S}{\sim} \text{REFLECTION}(G))$ – We prove the result in BFL language. Consider a plane disk D^2 containing the BFL. Do a $3D$-flip of D^2 carrying the BFL along. Clearly this maintains the ambient isotopy link associated to the BFL. The writhe of the components do not change: the blink has been reflected but also its crossings are switched, thus maintaining all crossing signs. The Proposition is established.

$(G \overset{S}{\sim} \text{REFDUAL}(G))$ – Note that $\text{REFDUAL}(G) = \text{REFLECTION}(\text{DUAL}(G))$, once applying (P) and (FV) followed by (P) and (C) is the same as applying only (FV) and (C). So, by the transitivity of the $\overset{S}{\sim}$ relation, using the previous two results, $G \overset{S}{\sim} \text{REFDUAL}(G)$. □

What about the blinks that did not fall in the gray region of Figure 3.18? What spaces do they induce? First, it is easy to see that they all induce the same space once, taking as reference the top most blink (north), the northeast blink is its reflection (*i.e.* to get there we must apply (C) and (P)), the southeast blink is its refdual and the northwest blink is its dual. So, by Proposition 3.7.1 they induce the same space. To finish the answer, let's focus again on the top most blink (result of (C) operation). It is obtained from the central blink by changing crossing status of the zigzag-edges. In the blink view of the g-blink this is equivalent to swap the colors of the edges from green to red and vice-versa. On the BFL view this is just that: change all the crossings. This has the effect of inverting the writhe of all components: for example, a component that had writhe 1 becomes one with writhe -1. So the end effect of this change is to invert the orientation of the original space. Conclusion: the g-blinks on the white region of Figure 3.18 induce the same space of the gray region g-blinks except for the

Figure 3.19 Dual g-blinks induce the same space

orientation that is changed.

One important consequence of the properties we described here is that we may search for distinct spaces on only one of the eight possible g-blinks. The other orientation of the space is trivially obtained from any g-blink. This saves computational effort of identifying distinct spaces.

We end this section by summarizing the effects on the structures of a g-blink, blink and BFL when the dual, reflection and refdual operations are applied.

DUAL(G)		
g-blink	*blink*	*BFL*
change parity (P) and swap face-edges and vertex-edges (FV)	*each face becomes a vertex, each edge becomes a dual edge with different color*	*overpass one external edge*

3.8 Merging and breaking g-blinks

Let A and B be distinct g-blinks. A *basepair on A and B* is a pair of angle-edges (a,b) so that $a \in A$ and $b \in B$. The *merging of A and B at basepair* (a,b), denoted by

$$A[a] + B[b] \ ,$$

is the g-blink obtained by replacing a and b by new edges e and e' both connecting A to B, having the same ends as a and b and linking vertices of distinct parity. See Figure 3.20 for an example.

Observe the result of the merging of Figure 3.20. The edges e and e' are both incident to the same g-face and g-vertex and we could reverse the merging by replacing e and e' back with a and b. Indeed, any pair of distinct angle-edges incident to the same g-face and g-vertex on a g-blink defines a *breakpoint*: a point where we can break a g-blink into two disconnected g-blinks. To *break* a g-blink on *breakpair* (e,e') is to separate it into two g-blinks by replacing edges e and e' by two new edges incident to same vertices of e and e' obtaining two disconnected g-blinks. For an example see Figure 3.20 from right to left.

Theorem 3.8.1 (Theorem on partial dual)**.** *Let A and B be arbitrary disjoint g-blinks and (a,b) a basepair on them. Then $A[a] + B[b] \overset{S}{\sim} A[a] + \textsc{Dual}(B)[b]$.*

In the language of BFLs the diagrammatic reformulation of Theorem 3.8.1 is given by the

Figure 3.20 Merging of A and B on *basepair* (a,b)

diagram below. Note that α and β are the ends of a and γ and δ are the ends of b.

The right diagram above is obtained by cutting the two wires π-rotating B and reconnecting the wires. (Note that the smiling fellow has only the right rear.) Theorem 3.8.1 was suggested by computer experiments very early in our research. It is a central result to curtail the number of relevant blinks: see next section. Its proof, however, was elusive until October 31, 2006: it has to wait for the proofs of Theorems 3.8.2 and 3.8.3.

Theorem 3.8.2 (Theorem on partial reflection)**.** *Let A and B be arbitrary disjoint g-blinks, (a,b) a basepair on them. Then $A[a]+B[b] \overset{S}{\sim} A[a]+\textsc{Reflection}(B)[b]$.*

In the language of blinks the diagrammatic reformulation of Theorem 3.8.2 is on the left part of the diagram below. The right part of it is the reformulation of the same Theorem in BFL

language. Note that the right ear becomes a left ear indicating a B-reflection.

Theorem 3.8.2 is proved by topological techniques allied to crucial facts on the theory of gems. It is done in Chapter 4. The proof of Theorem 3.8.2 is the main theoretical contribution of this thesis.

The diagrammatic reformulation of Theorem 3.8.3 in the language of BFLs is the passage

from the first to the third diagram below

The third diagram above is obtained by a $3D$-flip on B (getting the central diagram) followed by a ribbon move, regular isotopies and Whitney trick. The smiling to frowning change is to indicate that all the crossings are switched (and that the fellow became angry for being put upside down and being retracted from the ear). On the contrary of the previous Theorems we can tackle the proof of Theorem 3.8.3 immediately.

Theorem 3.8.3 (Theorem on partial refDual)**.** *Let A and B be arbitrary disjoint g-blinks, (a,b) a basepair on them. Then $A[a]+B[b] \overset{S}{\sim} A[a]+\textsc{RefDual}(B)[b]$.*

Proof. The proof is easy with the help of the BFL manifestation of the Theorem. See Figure 3.21. The ambient isotopy classes of the links corresponding to $A[a]+B[b]$ and to $A[a]+\textsc{RefDual}(B)[b]$ are the same. It is enough to prove that the writhe of each component of the BFLs is maintained. Outside the B there is no change in the crossing numbers. In the interior of B the crossings are switched and reflected (become upside down) thus, again, there is no

change in the crossing numbers. Finally, the crossing numbers of the new curls are in the same component and cancel each other. □

Figure 3.21 BFLs induce same space because are the same link with the same writhe at each component

Lemma 3.8.4. *For any g-blink B,*

$$\text{DUAL}(\text{REFLECTION}(B)) = \text{REFLECTION}(\text{DUAL}(B)).$$

Proof. By their combinatorial definitions in g-blinks the operations of taking the dual and reflecting are seen to be commuting involutions. Thus, both spaces in the statement of the lemma are equal to $\text{REFDUAL}(B))$. □

Lemma 3.8.5. *Theorem 3.8.1 is implied by Theorems 3.8.2 and 3.8.3.*

Proof. $A[a]+B[b] \overset{S}{\sim} A[a]+\text{REFLECTION}(B)[b]$ and $A[a]+B[b] \overset{S}{\sim} A[a]+\text{REFDUAL}(B)[b]$ imply by transitivity that $A[a]+\text{REFLECTION}(B)[b] \overset{S}{\sim} A[a]+\text{REFDUAL}(B)[b]$. Note that b is

an angle-edge in $C = \text{REFLECTION}(B)$. Taking $c = b$ we have for any blink C, $A[a] + C[c] \overset{S}{\sim} A[a] + \text{DUAL}(C)[c]$, establishing Theorem 3.8.1 for arbitrary disjoint g-blinks (A, C) and base-pairs (a, c). $\square$

From Lemma 3.8.5 and Theorem 3.8.3, Theorem 3.8.1 will follow from Theorem 3.8.2. The proof of this result is given at the end of Chapter 4.

3.9 Representative of a g-blink

We learned on Section 3.3 that a g-blink induces different blinks. All these blinks induce the same space, which is defined as the space of the g-blink. We saw also that different g-blinks may induce the same space: the g-blinks G, REFLECTION(G), DUAL(G) and REFDUAL(G) dual are different g-blinks but induce the same space. In this section we define a normalization procedure for g-blinks. This normalization maps a g-blink into another g-blink that induces the same space as the first. Our goal with this procedure is to look for different spaces on fewer g-blinks: we need to look for different spaces only on g-blinks that are normalized. The normalized version of a g-blink will be denoted as its *representative*.

We saw on Section 3.8 that a breakpair on a g-blink is a pair of angle-edges that are on the same g-vertex and the same g-face. Given a g-blink and one breakpair in it we may separate it into two g-blinks. Figure 3.22A shows a g-blink and its breakpairs: the gray arrows point to the pair of angle-edges of the breakpair. We can separate a g-blink in pieces (smaller g-blinks) until there are no more breakpairs. Figures 3.22B, 3.22C and 3.22D show this separation process. A piece without breakpairs is called a *block*. Figure 3.22D have 4 blocks. No matter what sequence of breakpairs one uses to separate a g-blink in blocks, the final blocks are always the same.

Some important properties of a breakpair that we need are related to the g-zigzags of its g-blink. They are the subject of next two propositions.

Proposition 3.9.1. *If p is a breakpair on g-blink G and its angle-edges are e_1 and e_2 then the g-zigzag of G that contains e_1 is the same as the one that contains e_2.*

Proof. Straightforward. □

Proposition 3.9.2. *The only g-zigzag z affected by separating a g-blink G on a breakpair p is the one that contains both angle-edges of p. If P_1 and P_2 are the pieces obtained by separating G on p then the g-zigzags of P_1 and P_2, except for z, were disjoint in G.*

Proof. Straightforward. □

Figure 3.22 Breakpoints of a g-blink and its breaking

We also saw on Section 3.8 that any pair of angle edges, each on different g-blinks may be the *basepair* of a g-blink merging operation. Think of the transition from Figure 3.22B to Figure 3.22A the basepairs are the angle-edges labeled 1 on Figure 3.22B. So, to merge two g-blinks on a basepair is to replace the basepair angle-edges by two new edges connecting the two g-blinks and respecting the parity.

The fact that the two g-blinks at the right of Figure 3.23 induce the same space is given by Theorem 3.8.1. The proof of this Theorem still depends on the proof of Theorem 3.8.2 which will be given in Chapter 4. It depends on topological facts and a reformulation of the BFL in terms of gems. As we have said before, this is the main theoretical contribution of our Thesis.

Follow Figure 3.23 to see an application of Theorem 3.8.1. The basepair in both rows are the same: the pair of edges labeled 1. The theorem together with the result we describe now form the basis of the normalization procedure.

Proposition 3.9.3. *Let A and B be two g-blinks. Let p be a basepair on them. Let α be the g-zigzag of the angle-edge of p on A and β be the g-zigzag of the angle-edge of p on B. Let p' be any other basepair on g-zigzags α of A and β of B. The result of A and B merged on p induces the same space as A and B merged on p'.*

For example, the g-blink resultant of the merge of Figure 3.24A on basepair labeled 1 induces the same space as the g-blink resultant of merging any pair of angle edges tagged with a "blue X" one from A and another from B of Figure 3.24B. Note that all angle-edges tagged with a "blue X" on Figure 3.24B are on the same g-zigzag of the angle-edges labeled 1 on Figure 3.24A.

Having Theorems 3.8.1, Theorem 3.8.2 and Theorem 3.8.3 at our disposal, we are now able to describe the normalization procedure. The intuitive idea is to separate the g-blink into blocks and then remount the blocks (or their duals, reflection or refdual, depending who is "smaller") in a canonical way. We divide this procedure in three phases: separating phase, intermediate phase and merging phase.

Separating phase. Let G be the g-blink we want to normalize. First give each g-zigzag of G an unique label. Let Z be the set of these labels. For each angle-edge e on G record the label

Figure 3.23 Merging A with B and with DUAL(B)

Figure 3.24 Merging on any angle-edge of the same g-zigzags

of the g-zigzag that contains e as its *zigzag label* z_e. Initialize the "pieces set" as $\mathscr{P} \leftarrow \{G\}$. Suppose there is a piece P in $\mathscr{P}$ with a breakpair p. Let e_1 and e_2 be the two angle edges of the breakpair p. Note that the zigzag labels of e_1 and e_2 are the same: $z_{e_1} = z_{e_2}$. Separate P into P_1 and P_2 and make the two new edges e'_1 on P_1 and e'_2 on P_2 have the same zigzag labels as e_1 and e_2: $z_{e'_1} \leftarrow z_{e_1}(= z_{e_2})$ and $z_{e'_2} \leftarrow z_{e_1}(= z_{e_2})$. Replace P with P_1 and P_2 on $\mathscr{P}$. Repeat this until $\mathscr{P}$ contains only blocks (g-blinks without breakpairs). The separating phase is finished.

Intermediate phase. Define a bipartite graph X. The vertices of X are the labels $z \in Z$ and the pieces $P \in \mathscr{P}$; there is an edge (z, P) between label z and piece P in X if there is an angle-edge e in P with $z_e = z$. Note that X is a tree: no cycles. Let pieces P_1 and P_2 be neighbors of label z on X. The only common neighbor of P_1 and P_2 must be z otherwise P_1 could not be separated from P_2 (See Proposition 3.9.2). This implies that there cannot be a cycle in X. Remove every vertex $z \in Z$ of X that has only one neighbor. This asserts that every leaf of X is a vertex P in $\mathscr{P}$. A consequence of this is that X has a single *center*. The center of a tree (see [**?**]) is obtained by removing all leafs of a tree in each step until arriving at a pair of vertices or a single vertex. By applying the tree center algorithm on X the leafs on each step alternates between z nodes and P nodes. So it must finish on a single node once there cannot be two adjacent z's or two adjacent P's. Let v be the center of X. We root X at v and X becomes a *rooted tree*. The idea now is to organize this rooted tree in a canonical way. To this aim we must have a way to compare nodes and subtrees.

Remember from Section 3.6 that every g-blink has a unique code. So we can compare g-blinks by comparing their codes. We know that merging a g-blink, or its dual, or its reflection or its refDual on the same basepair results in a g-blink that induces the same space. So we normalize $\mathscr{P}$ by replacing each piece P in it by min{ P, DUAL(P), REFLECTION(P), REFDUAL(P) }. Note that doing this does not affect the zigzag labeling of the angle-edges because angle-edges are preserved on these operations (*i.e.* dual, reflection and refdual). Note also that the P nodes of X are also updated by this criterion. Using the code of a g-blink we can also organize the rooted tree X. To organize X we mean to define a fixed sequence for the children of a node of X. We do this inductively. The base case is a node without child. This node is already organized, so we are finished. Consider a node u with children $w_1, \ldots, w_k$ all of

them already organized. To organize u we need to define a sequence for these children. Using the code of a g-blink we can define a function COMPARETREES(r_1,r_2) to compare organized rooted trees that is evaluated to -1 if tree rooted at r_1 is smaller than the tree rooted at r_2, to 0 if they are the same and to +1 if tree rooted at r_1 is greater than tree rooted at r_2. So to organize u is a matter of sorting $w_1, \ldots, w_k$ using the COMPARETREES function. With these explanations the problem of organizing X is solved. This also ends the intermediate phase.

Algorithm 2 COMPARETREES Algorithm

```
function COMPARETREES(r1, r2)
    s1 ← LINEARIZETREE(r1)
    s2 ← LINEARIZETREE(r2)
    n1 ← length(s1); n2 ← length(s2)
    i ← 1
    while i ≤ min(n1, n2) do
        (u1, level1) ← s1[i]
        (u2, level2) ← s2[i]
        if (level1 < level2) then return -1
        else if (level1 > level2) then return +1
        if κ(u1) < κ(u2) then return -1
        else if κ(u1) > κ(u2) then return +1
        i ← i + 1
    end while
    if n1 = n2 then return 0
    else if n1 < n2 then return -1
    else return +1
end function
```

```
function LINEARIZETREE(r)
    s ←<>
    procedure LT-DFS(u,level)
        s ← s· < (u, level) >
        for every children v of u taken in the ordered sequence do
            LT-DFS(v,level+1)
        end for
    end procedure
    LT-DFS(r,0)
    return s
end function
```

In this algorithm the code κ is taken over not only g-blinks but also on zigzag labels. Consider the code of a zigzag label the empty word. With this definition two zigzag labels z_1 and z_2 always satisfy $\kappa(z_1) = \kappa(z_2)$. Note also that a zigzag node code is smaller than any g-blink code.

Merging phase. The rooted tree X is already organized. The idea now is to merge the blocks using the order defined on X and using the code to define a canonical basepair for each merging operation. Let z be a label in X. Let $P_1, \ldots, P_k$ be the neighbors of z. If z is not the root of X then P_1 is the parent of z and $P_2 \ldots P_k$ are the children of z taken in order. If z is the root of X then $P_1 \ldots P_k$ are the children of z taken in order. We want now to merge the pieces $P_1 \ldots P_k$ in the order they appear. First P_1 with P_2, second the result of P_1 and P_2 with P_3 and so on. The only

thing not defined yet is the base point of each merging. This is solved using the code of the blocks. For each label z that appears on a block P we define a *canonical basepair angle-edge* e_P^z on the g-zigzag whose angle-edges are all zigzag labeled with z. This is done using the code labeling of P (see Section 3.6). Label the vertices of P with its code labeling. Define e_P^z as the angle-edge (among all angle-edges with zigzag label z on P) incident to the vertex of P that has the smallest label. The last thing we need to define is how to update the canonical basepair angle-edge after a merging operation. In symbols, after merging P_1 and P_2 whose canonical basepair angle-edges were $e_{P_1}^z$ and $e_{P_2}^z$ what will be the canonical basepair angle-edge $e_{P_1+P_2}^z$ of P_1+P_2? By definition $e_{P_1+P_2}^z$ will be the new angle-edge incident to the odd vertex of P_2. Repeat this merging for all zigzag label z in any order until no more merging may be done. Finished.

This three-phase procedure results in a unique g-blink $r(G)$, *the representative of* G. Both g-blinks, G and $r(G)$ induce the same space. A g-blink is said to be *a representative* if $G = r(G)$. We finish this section with an example in Figure 3.25 of the result of the algorithm that we have implemented for obtaining the representative of a g-blink (or blink).

3.10 Towards a census of spaces induced by small blinks

What spaces have a small blink presentation?

In this chapter we saw that a g-blink is a family of blinks that induce the same space and that any blink has an associated g-blink. Thus, our question is equivalent to

What spaces have a small g-blink presentation?

In this form, our original question becomes easier "to be computed" once a g-blink is a combinatorial object and the number of g-blinks with $\leq k$ g-edges is finite. Moreover, by being combinatorial simple objects, g-blinks have a direct way of going into computers. For instance, a g-blink may be represented in a computer by its code.

Figure 3.25 Representative of the dog like blink

By the fact that every g-blink is associated to a special g-blink with the same size that induces the same space called its representative, our question is also equivalent to

What spaces have a small representative g-blink presentation?

In this form, our original question becomes even "easier" in the sense that, with $\leq k$ g-edges, there are fewer "representative g-blinks" than "general g-blinks". Thus, this form is the one we use.

Suppose we have generated the set of all representative g-blinks with $\leq k$ g-edges for some $k \geq 1$. We already know that all spaces that have a presentation with $\leq k$ edges are there. But how to identify them? What elements of this set (representative g-blinks) induce the same space? In Sections 3.4 and 3.5 we described a way to calculate two space invariants from a g-blink presentation: the homology group and the quantum invariant. Calculating these invariants on all g-blinks we can partition this set in classes where each element of the same class has the same homology group and same quantum invariant. At this point we are sure that different classes induce different spaces because there is a topological invariant that distinguishes them. The remaining problem is to know if all g-blinks in the same class (same homology group and same quantum invariant) induce the same space. To prove that two g-blinks indeed induce the same space we will use a computational method in 3-Gem Theory that was described in [**?**]. Next chapter will be about 3-Gems and this computational method.

CHAPTER 4

3-Gems

4.1 Definition

An $(n+1)$-*graph* is a regular graph where all its vertices have degree $n+1$ and the edges incident to each vertex have distinct colors $0,1,\ldots,n$. Let $K \subseteq \{0,1,\ldots,n\}$ be a subset of colors and G an $(n+1)$-graph. Define $G[K]$ as the subgraph of G induced by K. We say that each connected component of $G[K]$ is a K-*residue* of G (note that K here is a subset of colors). If $k = |K|$ then a K-residue is also said to be a k-*residue* of G (note that k here is a number). If K is a set, we denote by $\overline{K}$ its complement ($\{0,\ldots,n\}\backslash K$). A 2-residue is also called a *bigon* and a 3-residue is also called a *triball*. A *3-gem* (acronym for 3-dimensional graph encoded manifold) is a $(3+1)$-graph where each of its 3-residues induces the surface of a sphere, $\mathbb{S}^2$. Each bipartite gem G corresponds to a unique space $|G|$. The easiest way to define $|G|$ is to start with v_G tetrahedra each with its 4 vertices painted each with one color of $\{0,1,2,3\} = \{h,i,j,k\}$ and glue a pair of tetrahedra t_u and t_v by identifying its faces opposite to the i-colored vertices so as to match colors i,j,k whenever there is an h-colored edge in G between u and v. In this way G is the dual of the pseudo-triangulation of the pseudo-manifold obtained by the gluing. In the case of a gem, the pseudo-manifold is a manifold. Given a 4-regular properly edge colored graph G denote $\alpha(G) = b_G - v_G - t_G$ the *agemality* of G, where b_G is the number of 2-residues of G, v_G is the number of vertices of G and t_G is the number of 3-residues of G. The agemality is non-negative and it is 0 if and only if G is a gem. Indeed we have ([**?**]):

Proposition 4.1.1. *Let G be a $(3+1)$-graph with b_G 2-residues, t_G 3-residues and v_G vertices, then G is a 3-gem if and only if its agemality is zero, that is,*

$$v_G + t_G = b_G.$$

4.2 Moves on gems

Let G be a 3-gem. An i-colored edge α of G is a *1-dipole* if the vertices incident to α are in different $\overline{\{i\}}$-residues. A pair of edges of G one with color i and the other with color j and with equal ends is a *2-dipole* if these ends are in different $\overline{\{i,j\}}$-residues. The creation and cancelation of a k-dipole ($k = 1,2$) does not change the induced space. A 3-gem free of 1-dipoles is said to be a *3-crystallization*.

A ρ*-pair* in a $(3+1)$-graph is a pair of edges of the same color that are incident to 2 or 3 common bigons (the two edges are both contained in 2 or 3 bigons of G). If the edges of the pair are incident to only two common bigons then the pair is said to be a ρ_2*-pair*. If the edges of the pair are incident to three common bigons then the pair is said to be a ρ_3*-pair*. If a ρ-pair is found in a gem we can get a smaller gem inducing the same space.

4.3 Simplifying dynamics

In this section we briefly review the simplifying dynamics on gems. This technique is developed in [**?**] and it uses the so called TS-moves and U-move which maintain the induced 3-manifold. The relevant algorithm to simplify gems and get to an attractor for the spaces induced by a gem is named the $TS_\rho U$-algorithm ([**?**]). We have re-implemented this algorithm which is the basis for the proof that the blinks with the same homology and the same quantum invariants up to $r = 12$ indeed induce the same spaces. The six TS-moves on gems are defined in Figure 4.1.

A *monopole* in a $(3+1)$-graph is a vextex which is the only intersection of an hi-gon and a jk-gon, (h,i,j,k) a permutation of $(0,1,2,3)$. This defines a configuration which induces a fundamental move in the classification of gems. A U_{mn}-move is defined on a monopole, by making the hi-gon of size $2m$ and the jk-gon of size $2n$ (whose union has $2m+2n-1$ vertices) disappear, being replaced by a cluster of squares with $(2m-1)\times(2n-1)$ vertices. A U_{mn}-move does not change the induced space of the gem. We give an example in Figure 4.2 of U_{23} move.

TS1
TS4
TS2
TS5
TS3
TS6

In general the U_{mn}-move increases the number of vertices of a gem. However, in conjuntion with the TS-moves and ρ-pairs the U_{mn}-moves have been so far sufficient to classify gems up to 30 vertices.

Figure 4.2 $U_{2,3}$-move applied to a 1-monopole of type (2,3)

4.4 From g-blink to 3-gem

Assume that G is a g-blink with no g-zigzags with g-edges alternating red and green. This kind of g-zigzag corresponds in the BFL to a component that goes totally over or totally under and can be separated from the rest of the BFL by Reidemeister moves II and III. Assume the following convention on the colors of a gem: $0 \equiv$ pink, $1 \equiv$ blue, $2 \equiv$ red, $3 \equiv$ green. We begin by proving a result which simplifies considerably the passage "blink $\to$ gem" first given in [**?**].

Figure 4.3 Simplifying the gem of a blink: from 12 to 8 vertices by crossing

Theorem 4.4.1. *Given a g-blink B with no alternating g-zigzags it is possible to obtain a gem $J^{\downarrow}$ where each edge of the blink (which corresponds to a crossing of the associated BFL) becomes the sub-configuration of 8 vertices shown in Figure 4.3I so that B and $G(B)$ induce the same*

space.

Proof. It is proved in [**?**] that replacing each crossing of the BFL associated to the blink by the configuration of Figure 4.3A the final gem $J^{\downarrow}$ will have the desired property. The rest of the proof consists in effecting dipole moves in J' so as to arrive at J. The sequence of dipole moves are depicted in Figure 4.3. The dipole moves are local and should be made in the neighborhood of each original crossing of the BFL. The resulting gem is $J^{\downarrow}$. □

The gem obtained from a blink by replacing each color of the BFL by the configuration of Figure 4.3I is called the *reduced canonical gem* of the blink.

We introduce the following notation to represent both a crossing and its switched form. The *octagon* of a crossing corresponds to an unidentified crossing. This is indicated by light green edges in the place of the normal green ones.

In Figure 4.4 we display a complete example of the above algorithm to go from a blink B to its canonical gem $J(B)$ inducing the same space. This example corresponds to Poincaré's homology sphere. Observe that an immersion of the gem in the plane is directly obtained from the embedding of the BFL. The gem obtained is bipartite. In going clockwise along the (blue,red)-gons (which corresponds to the faces of the BFL) the red edges go from a black to a white vertex. Observe that the pink-green gons form a neighborhood of the original blink. The convention here is that the green edges are the overpasses, while the pink edges the underpasses.

The difference between the *canonical reduced* gem of the blink $J^{\downarrow}(B)$ and the *canonical* gem of the blink $J(B)$ is that we introduce in the latter two 2-dipoles (red-green digons) at each site corresponding to a g-edge of the original g-blink. While redundant these $4|E(B)|$ vertices are convenient for our purposes as we show next. In the computer implementation we use only $J^{\downarrow}(B)$. The construction of Figure 4.4 emphasizes the geometric simplicity of the algorithm.

The main point in using the auxiliary red-green digons in defining $J = J(B)$ is that they induce, for each directed g-edge e between crossings α and γ, three cylinders $\mathscr{C}_e, \mathscr{C}_\alpha, \mathscr{C}_\gamma$. For a color i and a vertex a of a gem, denote by a_i the i-colored edge incident to a. Let $a_i^\star$ denote the 2-simplex in the dual pseudo-complex $J^\star$ corresponding to the edge a_i of the gem J.

Lemma 4.4.2. *Let q,r,s,t be the ends of the two red-green digons induced in J by the directed edge e of B, as shown in Figure 4.5. Then the sub-complex $\mathscr{C}_e = q_2^\star + q_3^\star + r_1^\star + r_0^\star$ is a non-singular cylinder in $J^\star$.*

Proof. Two 2-simplexes of $J^\star$ in colors i and j have a common 1-simplex if and only if the dual edges are in the same (i,j)-gon. Note that q_2 and q_3 are in the same $(2,3)$-gon, q_3 and r_1 are in the same $(3,1)$-gon, r_1 and r_0 are in the same $(1,0)$-gon and r_0 and q_2 are in the same $(0,2)$-gon. To complete the proof just note that there are 4 distinct vertices in the subcomplex $\mathscr{C}_e$, that q_2 and r_1 are not in the same $(2,1)$-gon and finally, that q_3 and r_0 are not in the same $(3,0)$-gon. □

The cylinder $\mathscr{C}_e$ is contained in the dual pseudo-complex $J^\star(B)$. Take a neighborhood $\mathscr{C}_e \times [0, .pdfilon]$ in $|J|$ identify $\mathscr{C}_e \times \{.pdfilon/2\} \equiv \mathscr{C}_e$ and define $\mathscr{C}_\alpha = \mathscr{C}_e \times \{0\}$ and $\mathscr{C}_\gamma = \mathscr{C}_e \times \{.pdfilon\}$. Let K be a simplicial complex which is a refinement of $J^\star$ containing both

Figure 4.4 Obtaining the canonical gems $J^{\downarrow}(B)$ and $J(B)$ from a blink B

$\mathscr{C}_\alpha$ and $\mathscr{C}_\gamma$ as sub-complexes. We observe that $|J| = |J^\star| = |K|$ and that vertices r and s of gem J are in $\mathscr{C}_e \times [0, .pdfilon]$.

Figure 4.5 Some cylinders induced in $K(B)$ by a directed edge of the BFL between crossings α and γ

The procedure GBLINK2GEM that follows apply to g-blinks without alternating zigzags. The procedure is purely combinatorial and it teaches the computer to go from a g-blink G to the 3-gem $J^\downarrow$ given in Theorem 4.4.1. For each vertex v of G we define two vertices v_i and v_o in j. Let e be a g-edge on G with vertices a,b,c,d as shown in Figure 4.6. Note that (a,b) and (c,d) are face-edges and (a,d) and (b,c) are vertex-edges. The vertices a_i, a_o, b_i, b_o, c_i, c_o,

a_o
d_o
d_i
a_i
a
e
d
b
c
b_i
c_i
b_o
c_o

d_i, d_o of $J^{\downarrow}$ corresponding to a, b, c, d are also shown on Figure 4.6. The i (in) index indicates that the vertex is drawn inside a g-vertex and the o (out) index indicates that the vertex must be drawn inside a g-face (or outside the g-vertex). The edges of $J^{\downarrow}$ are defined according to the following procedure:

1. Each g-edge e of G aligned like the scheme of Figure 4.6 induce the following edges on $J^{\downarrow}$:

	color 0	color 1	color 2	color 3
e is green	(a_i,c_o), (a_o,c_i)		(a_i,b_i), (c_o,b_o), (c_i,d_i), (d_o,a_o)	(a_i,a_o), (b_i,d_o), (b_o,d_i), (c_i,c_o)
e is red	(b_i,d_o), (b_o,d_i)		(a_i,b_i), (c_o,b_o), (c_i,d_i), (d_o,a_o)	(a_i,c_o), (b_i,b_o), (a_o,c_i), (d_i,d_o)

2. For every angle-edge $\hat{e} = (u,v)$ in G edges (u_i,v_i) and (u_o,v_o), both with color 1, are added to $J^{\downarrow}$.

3. At this point, some vertices in $J^{\downarrow}$ do not have a color 0 incident edge. Let u be a vertex in $J^{\downarrow}$ without a neighbor of color 0. We add the edge (u,v) with color 0 in $J^{\downarrow}$, where v is the result of

$$
\begin{aligned}
&x \leftarrow \text{neighbor}(v,1) \qquad\qquad .\\
&c \leftarrow 0\\
&\textbf{while } \text{neighbor}(x,c) \text{ is defined}\\
&\qquad x \leftarrow \text{neighbor}(x,c)\\
&\qquad c \leftarrow (c+1) \bmod 2\\
&v \leftarrow x
\end{aligned}
$$

The expression neighbor(x,c) denotes the vertex adjacent to x by color c in $J^{\downarrow}$. We do this until every vertex has an incident color 0 edge.

According to Theorem 4.4.1, $J^{\downarrow}$ defined this way is a 3-gem and it induces the same space as G does. We denote this procedure described here as GBLINK2GEM. A complete example of a g-blink and the 3-gem defined by GBLINK2GEM is depicted on Figure 4.7.

Figure 4.7 g-blink G and its reduced canonical 3-gem $J^{\downarrow}(G)$ defined by GBLINK2GEM

4.5 A proof of the partial reflection theorem

We first show that a breakpair $\{e, f\}$ in a g-blink C corresponds in $J^\star = J^\star(C)$ to a separating non-singular 2-torus T^2_{ef}.

Lemma 4.5.1. *The subcomplex $T^2_{ef} = \mathscr{C}_e + \mathscr{C}_f$ is a non-singular separating torus in the dual pseudo-complex $J^\star$.*

Proof. We have seen already that $\mathscr{C}_e$ and $\mathscr{C}_f$ are cylinders in $J^\star$. It remains to show that these cylinders have the same boundary and that $\mathscr{C}_e + \mathscr{C}_f$ is a torus. We refer to Figure 4.8. Note that q_2 and v_1 are in the same $(2,1)$-gon, r_1 and u_2 are in the same $(1,2)$-gon, q_3 and v_0 are in the same $(3,0)$-gon and that r_0 and u_3 are in the same $(0,3)$-gon. So, $T^2_{ef} = \mathscr{C}_e + \mathscr{C}_f$ is a non-singular torus. It clearly separates. This completes the proof. □

To simplify the notation henceforth we write T^2 in place of T^2_{ef}. Consider an $.pdfilon$-neighborhood $T^2 \times [0, .pdfilon]$ of $T^2 \subset K$ so that $T^2 \equiv T^2 \times \{.pdfilon/2\}$. If we now remove $T^2 \equiv T^2 \times \{0, .pdfilon\}$ from $|K|$ then we have two disjoint spaces $|K_A|$ with boundary $\mathscr{C}_\alpha + \mathscr{C}_\beta = T^2_{\alpha\beta} \equiv T^2 \times \{0\}$ and $|K_B|$ with boundary $\mathscr{C}_\gamma + \mathscr{C}_\delta = T^2_{\gamma\delta} \equiv T^2 \times \{.pdfilon\}$ as shown in Figure 4.8. It follows that

$$|K| = |K_A| \cup \big(T^2 \times [0, .pdfilon]\big) \cup |K_B|, \tag{4.1}$$

with

$$|K_A| \cap \big(T^2 \times [0, .pdfilon]\big) = T^2_{\alpha\beta}, \qquad \big(T^2 \times [0, .pdfilon] \cap |K_B|\big) = T^2_{\gamma\delta}, \qquad |K_B| \cap |K_A| = \emptyset. \tag{4.2}$$

For the proof of the Partial Reflection Theorem we present the 2-torus as the quotient space of $\mathbb{R}^2$ by the lattice of integer points: $T^2 = \frac{\mathbb{R}\times\mathbb{R}}{\mathbb{Z}\times\mathbb{Z}}$. Seeing T^2 in this way, the π-rotational symmetry that we will need becomes simply $(x,y) \mapsto (-x,-y)$. Let $F = \mathbb{R} \times \mathbb{R} \times [0,\pi]$. Consider

Figure 4.8 $1-1$ correspondence: breakpair $\{e,f\}$ in g-blink $C \leftrightarrow$ separating 2-torus T^2_{ef} in $J^\star = J^\star(C)$

the auto-homeomorphism μ of F given by

$$\mu(x,y,\theta) = (x\cos\theta + y\sin\theta, -x\sin\theta + y\cos\theta,\ \theta)\,.$$

Define $\equiv'$ as the equivalence relation on F: $(x,y,\theta) \equiv' (x',y',\theta')$ if $\theta' = \theta$, $x - x' \in \mathbb{Z}$ and $y - y' \in \mathbb{Z}$. The quotient space $F/\equiv'$ is denoted by F'. The image under μ of a the vertical segment linking $(x,y,0)$ to (x,y,π) is a helicoidal curve that starts at $(x,y,0)$, and finishes at $(-x,-y,.pdfilon)$. Note that any two vertical segments in F whose distance is an integer are identified. Clearly $F' \approx \mathbb{S}^1 \times \mathbb{S}^1 \times [0,.pdfilon]$.

Define $\equiv_\mu$ as another equivalence relation on F given by

$$(x,y,\theta) \equiv_\mu (x',y',\theta') \quad \text{if} \quad \mu^{-1}(x,y,\theta) \equiv' \mu^{-1}(x',y',\theta'), \text{ that is, if } \theta = \theta' \text{ and}$$

$$x\cos\theta - y\sin\theta - x'\cos\theta' + y'\sin\theta' \in \mathbb{Z}$$

$$x\sin\theta + y\cos\theta - x'\sin\theta' - y'\cos\theta' \in \mathbb{Z}.$$

The space $F/\equiv_\mu$ is denoted by $\widetilde{F}$. Observe the simple fact that μ induces a homeomorphism sending F' onto $\widetilde{F}$, also named μ by abuse of language. As a consequence of our definitions, two helicoidal curves in F are identified in $\widetilde{F}$ if their pre-images under μ are two vertical segments identified in F'. The action of μ in the fundamental domain centered at the origin from F' to $\widetilde{F}$ is shown in Figure 4.9.

We are now ready to prove Theorem 3.8.2

Proof of Theorem 3.8.2: Let A and B be arbitrary disjoint g-blinks, (a,b) a basepair on them. Then $A[a] + B[b] \overset{S}{\sim} A[a] + \textsc{Reflection}(B)[b]$.

Proof. Let J be the canonical gem of the g-blink $A[a] + B[b]$ and J' be the canonical gem of g-blink $A[a] + \textsc{Reflection}(B)[b]$. Let K be a simplicial refinement of $J^\star$ containing the 2-torus T^2 (given in Lemma 4.5.1) as a subcomplex. Let $\widetilde{K}$ be a simplicial refinement of $(J')^\star$ containing the 2-torus $\widetilde{T^2}$ (which plays in J' the same role of T^2 in J) as a subcomplex. Let h' be a fixed homeomorphism which maps $T^2 \times [0,.pdfilon]$ onto F' and $\widetilde{h}$ be a fixed

Figure 4.9 The action of μ on the fundamental domain centered at the origin mapping F' onto $\widetilde{F}$

Figure 4.10 For the proof of the Partial Reflection Theorem: gems J and J' induce the same space

homeomorphism which maps $\widetilde{T^2} \times [0, .pdfilon]$ onto $\widetilde{F}$. By applying Equations 4.1 and 4.2 to the tori T^2 and $\widetilde{T^2}$ we have ($-K_B$ is K_B with orientation reversed: they are oriented simplicial complexes):

$$|K| = |K_A| \cup \left(T^2 \times [0, .pdfilon]\right) \cup |K_B|, \quad |\widetilde{K}| = |K_A| \cup \left(\widetilde{T_2} \times [0, .pdfilon]\right) \cup |-K_B|, \quad |K_A| \cap |K_B| = \emptyset.$$

with

$$|K_A| \cap \left(T^2 \times [0, .pdfilon]\right) = T^2_{\alpha\beta}, \qquad \left(T^2 \times [0, .pdfilon]\right) \cap |K_B| = T^2_{\gamma\delta}, \tag{4.3}$$

$$|K_A| \cap \left(\widetilde{T^2} \times [0, .pdfilon]\right) = T^2_{\alpha\beta}, \qquad \left(\widetilde{T^2} \times [0, .pdfilon]\right) \cap |-K_B| = -T^2_{\gamma\delta}.$$

Define the map ρ from $|K|$ to $|\widetilde{K}|$ to be the identity in $|K_A| \cup |K_B|$. For $x \in T^2 \times [0, .pdfilon]$, define $\rho(x) = \left[(\widetilde{h})^{-1} \circ \mu \circ h'\right](x) \in \widetilde{T^2} \times [0, .pdfilon]$. Map ρ is the desired homeomorphism taking $|K|$ onto $|\widetilde{K}|$. □

We finish this chapter by proving the following Theorem about BFLs with a segment between crossings removed:

Theorem 4.5.2. *Let B° be a BFL B with a segment between crossings removed. There exists a well defined 3-manifold with toroidal boundary S° which can be associated to B°. Moreover, there exists a canonical way to close S° by attaching a solid torus to its boundary to get a space S such that $|B| = S$.*

Proof. The proof should be followed in Figure 4.11. Gem J is the canonical gem of the BFL B. Gems J' and J'' are obtained from J by 2-dipole creations. The last gem is subdivided into two gems with boundary H and U. The boundaries of these gems are homeomorphic to the 2-torus $T^2_{ef} = \mathscr{C}_e + \mathscr{C}_f$, given in Lemma 4.5.1. It can be shown that gem with toroidal boundary U induces a solid torus, thus completing the proof. □

Figure 4.11 Space $|H|$, $\partial(|H|) = T^2_{ef}$, canonical way to close it: $|B| = |H| \cup_{T^2_H \equiv T^2_U} |U|$, $|U|$ solid torus

CHAPTER 5

Computational experiments and results

5.1 A census of prime spaces induced by small g-blinks

In Section 3.10 we saw that if we have a set with all representative g-blinks with $\leq k$ g-edges, then all spaces induced by blinks with $\leq k$ edges are there. Even though, for any fixed $k \geq 1$ this set is finite, we would like to search for spaces in an even smaller set and not lose any space. This may be done if we believe in the following reasonable conjecture.

Conjecture 5.1.1. *Let a space S be the connected sum of prime spaces A and B. If the minimal blink presentations for A and B have respectively n_A and n_B edges, then n_S, the number of edges for the minimal blink presentation of S, satisfies $n_S = n_A + n_B$.*

A *minimal blink for a space* is a blink that has the same number of edges or fewer edges than any other blink presentation for that space. A *prime space* is one that cannot be expressed by a connected sum of two or more spaces different from $\mathbb{S}^3$. A *composite space* is a space that is not prime, *i.e.* one space that can be expressed by a connected sum of two or more spaces different from $\mathbb{S}^3$. A blink presentation for any composite space is obtained by drawing the blinks of each of its prime pieces separately in the same drawing: a red-green plane graph with more than one connected component. This construction clearly defines an upper bound for the minimal number of edges of the composite space: the sum of the number of edges of a minimal blink for each of its prime pieces. Suppose space S is the connected sum of n prime spaces, a minimal blink for S with n connected components satisfies this upper bound, otherwise there would be a blink for one of its prime pieces with fewer edges than its minimum number of edges which is a contradiction. The only possibility that remains to the conjecture to be false is a blink presentation with less than n components. On the other hand we have,

Proposition 5.1.2. *If Conjecture 5.1.1 is true then, knowing one minimal blink for each prime space that has a blink presentation with $\leq k$ edges, it is possible to exhibit a minimal blink for all spaces (composite or prime) that have a blink presentation with $\leq k$ edges.*

Proof. If S is a prime space that has a blink with fewer than k edges then, by hypothesis, we already know one minimal blink for it. If S is composite, then exhibit together in a single drawing the minimal blink of all its prime pieces. By the Conjecture 5.1.1 this is a minimal blink for S. □

A consequence of Proposition 5.1.2 is that, if Conjecture 5.1.1 is true, then to identify all spaces that have a blink presentation with fewer than k edges it is sufficient to know only the prime spaces that have a blink presentation with fewer than k edges. So, in our experiment, this is what we do. We focus only on prime spaces. We simplify our computational effort by answering not what are all the spaces with a blink presentation with fewer than k edges, but what are all the <u>prime</u> spaces with a blink presentation with fewer than k edges. So, we may reduce the set of representative g-blinks to representative g-blinks that are prime or, in practice, that are not easily shown composite.

Spaces have an orientation. If we swap the red-green edges of a blink the effect on the induced space is its change of orientation. So, any set of blinks B that induces spaces S may be easily extended to a set of blinks B' that induces S and also the changed orientation version of the spaces in S. The set B' is just B plus the blinks of B with the red-green edges swapped. This leads us to the following definition: a *set of blinks* is said to be *k-prime-unavoidable* if every space with a blink presentation with $\leq k$ edges is induced by some blink in this set or a red-green swapped version of some blink in this set. These notions are analogously extended to g-blinks. A *set of g-blinks* is said to be *k-prime-unavoidable* if every space with a g-blink presentation with $\leq k$ g-edges is induced by some g-blink in this set or a red-green g-edges swapped version of some g-blink in this set.

What we mean concretely by the title of this section: *a census of prime spaces induced by g-blinks* is a triple

$$(k, \mathscr{B}, f : \mathscr{B} \to \{1, \ldots, n\}),$$

where k is a positive integer, $\mathscr{B}$ is a k-prime-unavoidable set of g-blinks and f is a surjective function that maps each g-blink in $\mathscr{B}$ to an integer in $\{1, \ldots, n\}$ satisfying the constraints: if $B_1, B_2 \in \mathscr{B}$ induce the same space or induce the same space with swapped orientations then $f(B_1) = f(B_2)$, else $f(B_1) \neq f(B_2)$. Note that f defines a partition of $\mathscr{B}$ into n classes where the g-blinks in each class induce the same space modulo orientation. For this reason we call f the *partition function* of the census. In view of this definition of a census of prime spaces, the s.pdf to build one are: (1) define k; (2) define a k-prime-unavoidable set of g-blinks; (3) define the partition function f.

5.2 A prime-unavoidable set of g-blinks: U

To obtain a census of prime spaces induced by g-blinks with $\leq k$ edges, a set of k-prime-unavoidable g-blinks is needed. Before defining the specific way we did this generation it is good to say that in theory what is needed to do is simple: enumerate all representative g-blinks up to size k and discard those that you can show that are composite or that are not minimal. In practice we use some shortcuts to avoid a full enumeration of all representative g-blinks.

The procedure we defined to obtain a k-prime-unavoidable set was a pipeline with 4 s.pdf. The output of each step was the input to the next one. The final and intermediate results of this procedure for $k = 4$ is shown on Figure 5.1. The s.pdf on this pipeline, presented on this figure by an arrow and a number, are named: (1) BLOCKGENERATION, (2) BLOCKCOMBINATION, (3) COLORING and (4) FILTERING.

The BLOCKGENERATION step has as input one positive integer k: the maximum number of edges. Its output is all possible 2-connected plane graphs with number of g-edges not exceeding k plus the single-edge plane graph. By convention we see all these plane graphs as green-edged blinks. The blocks, besides the single-edged one, are obtained from the plane graph with two parallel green edges shown on Figure 5.2A by applying inductively and in all possible ways *vertex subdivisions* and *face subdivisions*. An example of vertex subdivision may be seen on Figure 5.2B. Any two distinct angles on a vertex are a base for this operation. An example of face subdivision may be seen on Figure 5.2C. Any two distinct angles on a face are a base for this operation. For $k = 4$, the number of resulting blocks is 7 as it is shown on Figure 5.1. The block term used here is also aligned to the fact that the g-blinks induced from these resulting green-edged blinks do not have breakpairs.

The BLOCKCOMBINATION step has as input k, the maximum number of edges or g-edges, and the resulting blocks from the BLOCKGENERATION procedure. Here we see this input as green g-blinks and apply the following algorithm. Let B the set with these input g-blinks or blocks. Make $A_1 = B$. For i from 2 to k make A_i the result of *combining* every g-blink at A_{i-1} with each g-blink in B. Combining a g-blink G with n_G g-zigzags to a g-blink G' with $n_{G'}$ g-

Figure 5.1 Pipeline of the k-prime-unavoidable set generation for $k = 4$

Figure 5.2 Block generation

zigzags results in $n_G \times n_{G'}$ g-blinks. This is the result of merging G and G' on basepairs coming from all distinct combinations of g-zigzags. This includes all possible spaces obtainable from merging G and G' as asserts Proposition 3.9.3. The g-blinks that overflows the maximum number of g-edges k are discarded. For $k = 4$, the number of resulting combinations is 17 as it is shown on Figure 5.1. Now we do an important observation. Merging two g-blinks and then assigning a color to each of its g-edges is the same as assigning the right colors in each of the two g-blinks before merging and then merging them. This implies that coloring the all-green g-blinks resulting from this step in all possible ways really spans all possible spaces.

The COLORING step has as input the all-green g-blinks from the BLOCKCOMBINATION procedure. The idea is to assign all possible g-edge color combination to each of the given g-blinks. For each g-blink assigned with a coloring some tests are made and this g-blink may be discarded if it is asserted that, by doing this, we are not losing a minimal g-blink to that same space (or its swapped orientation version). Let G be a g-blink already assigned a coloring, these tests are the following:

1. If the number of red g-edges on G is greater than the number of green g-edges then it is discarded. This is justified by the fact the red-green g-edges swapped version of G will not be discarded by this rule (green g-edges is greater than red g-edges) and it induces the same space as G with orientation changed.

2. If G contains the structure shown on the left side of Figure 5.3A it is possible to apply a Reidemeister move of type II reducing by 2 the number of crossings and preserving the space. So G is unnecessary once its induced space was already considered by some g-blink with fewer g-edges.

3. If G contains the structure shown on the left side pattern or the middle pattern of Figure 5.3B then it is unnecessary. If it contains the left side pattern of Figure 5.3B, by a ribbon move it is converted to the pattern on the middle of Figure 5.3B that may be converted by Whitney Trick to the right pattern of Figure 5.3B. All of them induce the same space, and the right pattern has fewer crossings.

Figure 5.3 Structures to identify g-blinks that may be discarded

4. If G contains the pattern on Figure 5.3C then it has a *circumcised component* and may be simplified by moves in the BFL calculus to a g-blink with fewer crossings as it is explained on pages 138–140 of [**?**]. So, it may be discarded.

5. If G contains the left or the right pattern on Figure 5.3D then it may be simplified by the move $K_4(1)$ of BFL calculus to the middle pattern with only one crossing. So, it may be discarded.

6. If G seen as a BFL contains more than one component (more than one g-zigzag) and one of the components is completely overcrossing the others or completely undercrossing the others than it may be separated by Reidemeister moves and is not a minimal presentation.

If g-blink G passes all tests then one last transformation is done. The g-blink included in the result set of this step is actually $\min\{r(G), r(-G)\}$: the smallest g-blink between the representative of G or the representative of $-G$ (*i.e.* g-blink G with all crossings changed (C) or, equivalently all g-edge colors swapped). This resulting g-blink is asserted to induce the same space as G or its changed orientation version. Observe that the g-blinks resulting from this step are all representatives. For $k = 4$, the number of g-blinks resulting from this step is 12 (see Figure 5.1).

The FILTERING step has as input the representative g-blinks resulting from the COLORING step. Let B be this input set and $R = \{\}$, initially empty, be the result set. The filtering algorithm flows like this:

```
while B is not empty do
    G ← an element of B
    RM3 ← closure of G by Reidemeiter III Move
    if no element of RM3 may be discarded by rules 2 to 6 of the COLORING step then
        R ← R ∪ {G}
    end if
    B ← B\RM3
end while
```

The idea of this step is to use the Reidemeister III move, that preserves the number of crossings and the space, to find some blink version of the space that may be simplified by the

rules 2 to 6 explained on the COLORING step. If there exists such a version then that g-blink and the whole closure of g-blinks obtained from it by Reidemeister III may be discarded. Otherwise only the given g-blink on its Reidemeister III closure may be preserved (that is why we remove all RM3 set on line 7 of the above algorithm). The result of this step for $k = 4$ is a set with 10 g-blinks (see Figure 5.1).

We name U the set resulting from this pipeline for $k = 9$. This set is, as we saw in its construction, a 9-prime-unavoidable set and has 3437 g-blinks divided in 1 g-blink with 1 g-edge, 1 g-blink with 2 g-edges, 2 g-blinks with 3 g-edges, 6 g-blink with 4 g-edges, 12 g-blinks with 5 g-edges, 43 g-blinks with 6 g-edges, 133 g-blinks with 7 g-edges, 585 g-blinks with 8 g-edges and 2654 g-blinks with 9 g-edges. We denote by $U[1]$ the smallest g-blink in U, $U[2]$ the second smallest g-blink in U, up to $U[3437]$ the greatest g-blink in U. The time elapsed to generate the set U was less than twelve hours. At this point we have the first two ingredients to a census of prime spaces up to 9 g-edges: $(9, U, ?)$. The only missing part is the third ingredient of a census: the partition function. This is the subject of next section.

5.3 Topological classification of g-blinks in U

The set U is a 9-prime-unavoidable set of g-blinks. The next step to define a census of prime spaces with a g-blink (or blinks) presentation with up to 9 g-edges (edges) is to identify what g-blinks induce different spaces and what g-blinks induce the same space (modulo the orientation). To reach this goal the first thing we did was to calculate, for each g-blink in U, the homology group and the Witten-Reshetikhin-Turaev quantum invariant (for $r \in \{3,4,5,6,7,8\}$) of its induced space. In Sections 3.4 and 3.5 we show how to do this calculation from a g-blink presentation of a space. To help on this exposition we will use HG, QI and HGQI when we want to refer to the homology group, quantum invariant, respectively. The time elapsed to calculate the HG and QI of all g-blinks in U was less than half an hour.

The effect on the quantum invariant of changing the orientation of a space is that each complex number in its sequence becomes its conjugate (remember that the quantum invariant

is a sequence of complex numbers). So when two g-blinks have their QIs differing by, for each r, one being the conjugate of the other, then these g-blinks may induce the same space in different orientations. As it was defined for a census, g-blinks that induce distinct orientations of the same space are mapped, by the partition function, to the same value. We are interested in spaces modulo orientations. For this reason, we mounted from the HG and QI data of each g-blink in U the information named HGnQI (HG and normalized QI). It is just the pair HG and nQI where nQI is the normalized version of QI: if the first complex entry with imaginary part in QI is negative then nQI entries are the conjugate of QI entries, otherwise nQI is equal to QI.

Using the HGnQI information of each g-blink we partitioned the set U into 501 classes. The 3437 g-blinks of U induced 501 distinct HGnQIs. One consequence of this fact is that U induces, at least, 501 different (modulo orientation) spaces. This HGnQI partition of the set U is a first candidate for the partition function to the census we want. If the homology group together with the quantum invariant is a strong enough invariant of space, then we already have the exact partition function we want. To prove this, it remains to show that all entries in the same HGnQI class indeed induce the same space. To do this, we need another tool. Before entering into this topic, we want to make some comments about the HGnQI partition of U.

After partitioning the set U in HGnQI classes, a very apparent fact was that the quantum invariant was almost perfect in identifying the 501 classes. It, alone, separated U into 498 classes. In only 3 cases the homology group was important to distinguish spaces that the quantum invariant did not. In Figure 5.4 we show a blink presentation for these 3 cases. In the first case, $U[8]$ has HG (1) while $U[3308]$ has HG $(1)5^1$ and the 12 first entries of the quantum invariants, as is shown, are all real numbers. Indeed, all entries in the QI of $U[8]$ sequence are real once it has only one orientation. For a proof of this fact note that $\textsc{Dual}(U[8])$ is $U[8]$ with all edges being red which is also $U[8]$ after applying (C) (change crossings). As these two g-blinks are the same g-blink and they are the two possible orientations for the space, we can conclude that this space has only one orientation. In the second case, $U[38]$ has HG (3) while $U[536]$ has HG $(0)2^2$ and the 12 first entries of the quantum invariants, as is shown, are all integer numbers. In the third case, $U[86]$ has HG (1) while $U[2385]$ has HG $(1)5^1$ and the 12 first entries of the quantum invariants, as is shown, are all complex numbers. It might be

(1) (1) 5^1 (3) (0) 2^2 (1) (1) 5^1

3	1.0000000000	0.0000000000i
4	0.0000000000	0.0000000000i
5	0.5000000000	0.0000000000i
6	0.0000000000	0.0000000000i
7	1.0000000000	0.0000000000i
8	1.0000000000	0.0000000000i
9	0.0000000000	0.0000000000i
10	-0.6180339887	0.0000000000i
11	0.0000000000	0.0000000000i
12	1.0000000000	0.0000000000i

3	2.0000000000	0.0000000000i
4	3.0000000000	0.0000000000i
5	4.0000000000	0.0000000000i
6	5.0000000000	0.0000000000i
7	6.0000000000	0.0000000000i
8	7.0000000000	0.0000000000i
9	8.0000000000	0.0000000000i
10	9.0000000000	0.0000000000i
11	10.0000000000	0.0000000000i
12	11.0000000000	0.0000000000i

3	1.0000000000	0.000000
4	0.0000000000	0.000000
5	0.5000000000	0.363271
6	0.0000000000	0.000000
7	-0.5990311321	1.756759
8	1.0000000000	1.414213
9	0.2869889761	0.342020
10	0.9270509831	0.951056
11	0.2325931483	-0.106221
12	-1.0000000000	2.000000

Figure 5.4 The 3 cases in U where HG helped QI to distinguish spaces

the case that the quantum invariant in some point distinguishes these spaces as the homology group did. We did not check this.

Now let's return to our open problem. Are the 501 HGnQI classes really inducing the same space or some of them induce more than one space? To answer this question we used 3-gem theory. We saw in Section 4.4 that from a g-blink we can obtain a 3-gem inducing the same space as it does. This fact enables us to change our question in g-blink language into a question in 3-gem language. The idea is to take, for each of the 501 HGnQI classes, all g-blinks in the same HGnQI class, calculate a 3-gem version for it and then try to find a proof that they are the same space, *i.e.* a path of "moves" in 3-gems that preserve the induced space connecting all these 3-gems.

The 3-gem that we associated to each g-blink in U was given by the function GEMOFG-BLINK shown in Algorithm 3. The idea of this function is to simplify the initial 3-gem of the g-blink given by the GBLINK2GEM procedure explained in Section 4.4 using dipole cancelations, ρ_2-moves, ρ_3-moves and TS-moves until it cannot be simplified anymore or until a certain timeout occurs. This step resulted in 999 distinct gems for the 3437 g-blinks of U. We used a timeout of 12 seconds. From these 999 3-gems, 657 (or 65%) gems were proven to be TS-class representatives (minimum 3-gem in the class) such that the entire class had no simplifications of the types: dipole cancelation, ρ_2-move and ρ_3-move. The remaining 342 3-gems were the minimum 3-gem obtained before the timeout occurred. The 3-gem also encodes the orientation of the space, but, in this case we used 3-gems modulo orientation. In other words, the 3-gem we associated to each g-blink could be exactly the same space, or the same space with orientation changed. As it might be clear now, this is enough here: spaces modulo orientation.

The remaining challenge at this point was to find whether these 999 3-gems, seen as nodes of a graph, could be connected in 501 connected components, where a connected component means that all gems in the same component induce the same space (modulo orientation). So, we started to insert edges in this graph of 999 nodes and initially no edge. This was done by "perturbing" the gems on the nodes by using U-moves and then applying the same simplification procedure used in the function GEMOFGBLINK until a gem with no simplification or a

Algorithm 3 Algorithms for 3-Gems

```
function GemOfGBLink(G)
    J ← GBLink2Gem(G)
    while true do
        SimplifyGem(J)
        SearchInTSClass(J, 12 seconds)
        if J has no dipole, no ρ2-pair and no ρ3-pair then
            break
        end if
    end while
    return J
end function
```

```
procedure SimplifyGem(J)    ▷ J becomes its simplified version
    while true do
        if there is a dipole in J then
            apply dipole cancelation in J
        else if there is a ρ3-pair or ρ2-pair in J then
            apply ρ3-pair or apply ρ2-pair in J
        else
            break
        end if
    end while
end procedure
```

```
procedure SearchInTSClass(J, maxtime)
    C ← {J}   U ← {J}    ▷ C is the current TS-class of J and U are the unprocessed gems
    while U is not empty and elapsed time < maxtime do
        J′ ← a gem in U
        U ← U \ {J′}
        for all possible TS-moves m in J′ do
            J″ ← J′ with TS-move m applied
            if J″ ∉ C then
                if there is a dipole or ρ2-move or ρ3-move in J″ then
                    J ← J″ and exit
                else
                    U ← U ∪ {J″}
                    C ← C ∪ {J″}
                end if
            end if
        end for
    end while
    J ← min{J′ ∈ C}
end procedure
```

timeout occurred. This final gem, if not yet in our graph, was added as a new node. An edge, if not existent, from the perturbed 3-gem node to this new, or already existent, node, was also added to the graph. This procedure was oriented by the HGnQI classes, so if a HGnQI class was already a single connected component then nothing more was needed to be done there: the HGnQI class was proved to be a single space (modulo orientation). This procedure of connecting the gems of a HGnQI class on this graph took about 3 days with manual interference being important: by looking at the graph we perturbed the most promising nodes. The final result was: 499 of the 501 HGnQI classes were proven to induce a single space (modulo orientation). In only two HGnQI classes we could not find a single connected component.

Figure 5.5 shows subgraphs (trees) for 4 HGnQI classes on the final graph. The red nodes are g-blinks from U. The yellow nodes are the 3-gems. Note that every red node is connected to a single yellow node: this yellow node is the result of the GEMOFGBLINK applied to this g-blink. Figure 5.5A was an easy case where all g-blinks of the same HGnQI class were pointing right to the same 3-gem. Nothing was needed to do in this case. Figure 5.5B was one of the difficult cases: many redundant edges (not shown) and different 3-gems were generated before all g-blinks were connected.

Figures 5.5C and 5.5D presents the two cases where one doubt was left. In each of these cases, two connected components remained: they are shown with the dark line separating them. In the first case, Figure 5.5C, the HGnQI class had 5 g-blinks where 4 of them were proven to be the same space. In the second case, the HGnQI class had 3 g-blinks where 2 of them were proven to induce the same space. A blink and BFL presentation for the g-blinks involved in these doubts are shown in Figure 5.6. In the first doubt, the g-blinks involved are $U[1466]$, $U[1563]$, $U[1738]$, $U[2233]$, $U[2866]$ and $U[1563]$ is the only g-blink we did not find a proof as being the same space (modulo orientation) of the others. In the second doubt, the g-blinks involved are $U[2125]$, $U[2165]$, $U[3089]$ and $U[2165]$ is the only g-blink we did not find a proof as being the same space of the others. Is there a proof for these two cases and we just could not find them or are these the only weak points of the HGnQI invariant on the set U? We leave this question open and register it as the following conjectures.

Conjecture 5.3.1. *The spaces induced by all 5 blinks or BFLs on Figure 5.6A are the same.*

Figure 5.5 Graphs of g-blinks (red nodes) and gems (yellow nodes). The first two are trees and the last two are forests with two components (the two uncertainties)

Figure 5.6 The only 2 classes with same HGnQI where a proof of the homeomorphism was not found

Conjecture 5.3.2. *The spaces induced by all 3 blinks or BFLs on Figure 5.6B are the same.*

The only reason we conjecture these stems from the fact that HGnQI have not failed in all other 499 cases. But, the fact that we had no success, after various days of computational effort trying to prove these conjectures using the simplification combinatorial dynamics of 3-gems, suggests the contrary: these conjectures are false. Figures 5.5C and 5.5D show the two trees that could not be connected for each case after all the computational effort.

All data involved in all the experiments we explained here are in a computer program named BLINK. So a proof that all HGnQI classes indeed induce the same space, except for the two cases explained, can be exhibited by this program.

In the 3-gem presentation it is sometimes possible to identify that its induced space is composite. For example the space induced by g-blink $U[31]$ is also induced by a 3-gem (r_4^{18} in the 3-gems catalogue of [**?**]) that contains a *disconnecting quartet*, *i.e.* four edges with distinct colors that disconnected the 3-gem. The existence of this structure in a 3-gem or the existence of handles, *i.e.* connected sums with $\mathbb{S}^2 \times \mathbb{S}^1$, is a proof that the induced space is composite. In the 501 HGnQI classes, using this kind of 3-gem information, we could prove that 14 of them were composite. The rules that we used in the construction of U were not able to identify that some g-blinks induced composite spaces, but, anyway, that was not the goal there. The goal there was to create a small set of g-blinks that did not lose a minimal presentation by g-blink of a prime space. This is the important property of U: all prime spaces have a minimal g-blink presentation in U. Using this information of the 14 composite classes, we named each of the 501 HGnQI classes like this: the 487 classes that were not proven composite gained names 1.1, 2.1, 3.1 ... 3.2, 4.1 ... 4.5, 5.1 ... 5.6, 6.1 ... 6.19, 7.1 ... 7.38, 8.1 ... 8.119 and 9.1 ... 9.296; the 14 classes that were proven composite gained names 6.1c ... 6.3c, 8.1c ... 8.5c and 9.1c ... 9.6c. The number before the point stands for the number of g-edges of the minimal g-blink in U found for that space. Let $U[n.i]$ denote the smallest g-blink (*i.e.* smallest code) in class $n.i$, *i.e.* $U[n.i] = \min\{G \in n.i\}$. For instance $U[5.1]$ is $U[11]$ and $U[6.1\text{c}]$ is $U[31]$. The number after the point stands for the following: $n.1$ is the class where g-blink $U[n.1]$ has n g-edges and is the smallest g-blink among all classes $U[n.j]$, for any j that defines a valid class name; $n.2$ is the class where g-blink $U[n.2]$ has n g-edges and is the second smallest g-blink among all

classes $U[n.j]$, for any j that defines a valid class name; and so on. The two classes that we do not know whether they induce a single space or two spaces are 9.126 (Figure 5.6A) and 9.199 (Figure 5.6B).

The 14 composite spaces in U are in Appendix B. The quantum invariant at level r of the connected sum of spaces $A_1 \dots A_n$ is the product of their quantum invariants at the same level divided by the r-th quantum invariant of $\mathbb{S}^3$ to the power $n-1$. Using this we could align the orientations of the prime spaces that produced these composite spaces. Figure 5.7 shows explicitly these 14 spaces as a prime space composition with the correct orientation.

The space $\mathbb{S}^2 \times \mathbb{S}^1$ has a blink presentation that is just a vertex and no edges, *i.e.* a BFL that has no crossings and is just a closed loop. This space is a special one as it is the only prime space that has a blink presentation without edges. By the rules we used on the construction of set U this space needed not to appear once: (1) we did not include blinks without edges and (2) only one minimal presentation of a space was asserted to appear. This space should be included artificially after. In spite of that, $\mathbb{S}^2 \times \mathbb{S}^1$ appeared as class 6.5. Figure 5.8 shows a blink and a BFL for the 36 g-blinks in class 6.5. In a strict sense, this class could be named 0.1 and spaces 6.6 to 6.19 would be decreased by one to 6.5 to 6.18, but we do not do this.

Theorem 5.3.3. *Any prime space that has a blink presentation with ≤ 9 edges induces the same space (modulo orientation) as one and only one of the 487 blinks in Figure 5.9 or the 487 BFLs in Figure 5.10 or the 487 spaces shown in Appendix A.*

Proof. The construction of set U asserts that it contains at least one minimal g-blink for each prime space except for space $\mathbb{S}^2 \times \mathbb{S}^1$, which is a special case where its minimal blink presentation has no edges: only a single vertex. In spite of that $\mathbb{S}^2 \times \mathbb{S}^1$ appears in U as class 6.5 so any prime space is included. The proof that there are only 487 (with 2 doubts) is in the program BLINK. □

Figure 5.7 The 14 composite spaces in U

Figure 5.8 Blink and BFL presentations for g-blinks in 6.5: space $\mathbb{S}^2 \times \mathbb{S}^1$

Figure 5.9 List of 487 blinks that induce once any prime space (modulo orientation) that has a blink presentation with ≤ 9 edges

Figure 5.10 List of 487 BFLs that induce once any prime space (modulo orientation) that has a BFL presentation with ≤ 9 crossings

5.4 Spaces induced by simple 3-connected monochromatic blinks

Blinks bring to the stage a very interesting connection: spaces and plane graphs. Can concepts of graph theory when interpreted in space language bring light to some unknown aspect of spaces? Some new invariant for spaces?

With this spirit, what can we say about the space of a blink that is k-connected? In Chapter 3 we saw that the blocks (2-connected pieces) of a blink may be recombined in different ways leading to the same space. What are these blocks? In this crude form, this concept of block or more general k-connected blink does not mean something useful in the language of spaces because of the following observation: using the B_2 move of blink calculus (*i.e.* RM_2 in BFL calculus) explained on Section 3.2 one may obtain blinks with higher connectivity inducing the same space. But this comes at a price, these equivalent versions with higher connectivity contains local simplifications (moves that reduce the number of edges) that leads back to the first blink we started. A family of blinks that do not contain these local simplifications are the monochromatic blinks. Note that all simplification moves on the blink calculus shown in Section 3.2 are, except for $B_4(1)$, from pieces with two colors. When talking about blocks or higher connected monochromatic blinks there is no local simplification at all. So, the connectivity issue on monochromatic blinks might mean something on spaces.

Let B be a green (all edges green) blink, B' be a green blink whose map (plane graph) is the dual map of B, B'' be B reflected on the plane and B''' be B' reflected on the plane. As we saw in Chapter 3 all these blinks induce the same space modulo orientation. Let's denote as *trivial* a pair of blinks A and B if they induce the same space modulo orientation and $A \in \{B, B', B'', B'''\}$. A pair of blinks inducing the same space modulo orientation that is not trivial is called *non-trivial*. Are all pair of green blocks (2-connected blinks) that induce the same space modulo orientation trivial? No. Space 7.29 in Appendix A has a counterexample. Figure 5.11 shows a pair of non-trivial green 2-connected blinks in space 7.29 that induces the same space. By the fact that they all induce the same space, there must exist paths connecting these blinks (or BFLs) using the moves on the blink calculus (or BFL calculus). Can you find such a path? We found the path via gem theory.

7.29

What about simple 3-connected monochromatic blinks? Are there non-trivial pairs of simple 3-connected monochromatic blinks? To answer this question we generated a set named T with all simple 3-connected green blinks up to 16 edges[1] and calculated their HGnQI invariants (QI up to level 8). The result was interesting. There are 708 simple 3-connected monochromatic g-blinks and they are divided in 381 classes HGnQI. These classes were named: 6.1t, 8.1t, 9.1t, 10.1t... 10.2t, 11.1t ... 11.2t, 12.1t ... 12.9t, 13.1t ... 13.11t, 14.1t ... 14.36t, 15.1t ... 15.76t and 16.1t ... 16.242t. This name convention is analogous to the convention of the HGnQI classes in U except for the letter "t" at the end. These classes are presented with details in Appendix C. In these 381 classes there are only 11 classes with exactly one non-trivial pair candidate. They are shown in Figure 5.12.

Is any of these a non-trivial pair or all of them induce different spaces modulo orientation that the HGnQI could not capture? We leave this question open.

[1]To generate the simple 3-connected maps we started from the wheel maps (maps that are a polygons with its vertices connected to a central vertex) and then, inductively, we subdivided the faces and vertices in all possible ways preserving the 3-connectivity property.

14.24t
15.16t
15.19t
15.22t
16.56t
16.141t
16.142t
16.233t
16.42t
16.140t
16.149t

CHAPTER 6

Conclusions and future work

6.1 Results, uncertainties and the need of new invariants

BLINK CALCULUS

The first contribution of this thesis that we want to stress here was given in Section 3.2. Based on the BFL calculus (*i.e.* Kirby's calculus reformulated in BFL language) we obtained a purely blink calculus. This calculus is a formal language which is a counterpart for homeomorphism of spaces. Figure 6.1 presents again our blink calculus. Although theoretically complete (it is supported by Kirby's Calculus) this calculus was not used in our computational experiments as a tool to prove homeomorphisms. For this task we used the combinatorial simplification dynamics of 3-gems. In spite of that, we think that the blink calculus can help in the search for new space invariants.

DECOMPOSITION/COMPOSITION THEORY

A second contribution of this work that was important to the computational results are the following propositions and theorems in g-blink language:

(Theorem on partial dual 3.8.1) *Let A and B be arbitrary disjoint g-blinks,* (a,b) *a basepair on them. Then* $A[a]+B[b] \overset{S}{\sim} A[a]+\text{DUAL}(B)[b]$.

(Theorem on partial reflection 3.8.2) *Let A and B be arbitrary disjoint g-blinks,* (a,b) *a basepair on them. Then(*$A[a]+B[b] \overset{S}{\sim} A[a]+\text{REFLECTION}(B)[b]$.

(Theorem on partial refDual 3.8.3) *Let A and B be arbitrary disjoint g-blinks,* (a,b) *a basepair on them. Then* $A[a]+B[b] \overset{S}{\sim} A[a]+\text{REFDUAL}(B)[b]$.

The third theorem on partial refDuals is obtained directly from the framed link theory.

Figure 6.1 Blink formal calculus by local coins replacements

Given this third theorem, the first two theorems are equivalent: given one we have the other. The theorem on partial reflection was tricky to obtain. We used both the theory of gems and the BLINK2GEM algorithm as well as topological machinery to exhibit an explicit homeomorphism. Section 4.5 contains this proof. These theorems yield a block decomposition/composition theory which leads to the representative concept and curtailed search spaces of our computational experiments.

AN UNAVOIDABLE SET OF BLINKS UP TO 9 EDGES

We achieved our initial main objective which was to classify spaces presentable by blinks with small number n of edges. At the level of $n \leq 9$ the combination of tools

- theory of decomposition/composition leading to representative g-blinks — which reduces the search space
- quantum invariants and homology — which provide distinctiveness
- combinatorial simplification dynamics of 3-gem theory — which provides similarity

was as effective as leaving only two uncertainties in more than 500 spaces. These uncertainties, as we saw in Section 5.3, were registered as Conjecture5.3.1 and Conjecture 5.3.2. To be honest, these conjectures are actually doubts and seem an interesting research problem. It could be answered by a new invariant which complements the HGnQI invariant. In any case (*i.e.* the two conjectures are false, or one is true and the other is false, or both are true) the relevant fact is that any space that has a blink presentation with up to 9 edges is induced by only one of the classes in Appendix A, where classes 9.126 and 9.199 may be broken into two classes each. A space that is not prime and has a blink presentation with ≤ 9 edges is just a blink with more than one prime component which is in the catalogue (Section 5.1).

In the case of simple 3-connected monochromatic blinks with up to 16 edges there are only the 11 uncertainties shown in Figure 6.3. We did not use the simplification combinatorial dynamics of 3-gems to deal with these cases.

Figure 6.2 The only 2 classes with same HGnQI where a proof of the homeomorphism was not found

14.24t
15.16t
15.19t
15.22t
16.56t
16.141t
16.142t
16.233t
16.42t
16.140t
16.149t

Putting together blinks that induce the same space in a non-trivial way (Appendix A, Appendix B and Appendix C) we hope to be contributing with non-trivial examples that can motivate and help the search for new effective subtle invariants of spaces to complement the HGnQI invariant.

6.2 The inverse algorithm: from gem to blink

A rather frustrating fact up to now is that we could not find a blink for the space EUCLID$_1$. This space is generated by the rigid gem r_5^{24} (notation of 3-gems catalog of [**?**]). Blinks and BFLs for the other euclidean spaces are given below.

They correspond, respectively, to spaces 6.8, 7.10, 8.32, 5.4 and 6.13. By looking at quantum invariants of these spaces (see Appendix A) we are led to the following conjecture.

Conjecture 6.2.1. *The absolute value of the quantum invariants of the euclidean spaces are non-negative integers for all levels r.*

The missing EUCLID_1 space motivates the following discussion.

There exists a rather simple algorithm to go from a framed link inducing a space to a triangulation of the same space. This was first done in chapter 11 of [**?**] via *graph encoded 3-manifolds* or *gems*. This algorithm was improved here in Section 4.4 and it is a central tool in the BLINK program to prove spaces in U are homeomorphic. Figure 6.4 shows this algorithm. Thus to get a gem from a blackboard framed link is a direct task.

Figure 6.4 Blink to gem algorithm: indispensable to prove homeomorphisms of blinks

However, the contrary, given a gem to find by a polynomial algorithm a blackboard framed link inducing the same 3D-space is, as far as we know, an untouched problem in the literature. Figure 6.5 shows this computational gap as a red arrow. The reason why it is desirable to have

this arrow in black stems from the fact that the quantum invariants are not computable from a triangulation or gem based presentation of 3D-spaces. The two languages, triangulations and blackboard framed links have at present only a one way translation.

Figure 6.5 Blink based presentation and 3-Gem based presentation

Trying to get this converse algorithm took a long a time of our research for this thesis. Only recently we got confident that we have succeeded. A first step in this direction was given in the paper [**?**], where a linear algorithm to prove the Lickorish-Wallace Theorem is provided. The second part, which actually presents the blink from the gem is a joint work with S. Lins [**?**] and awaits a proper computer implementation. The first test of this implementation will be to get a blink for EUCLID_1.

6.3 The BLINK computer program

A computer program to manipulate spaces through its many possible presentations was one of our goals in this work. Indeed, a great effort was made to bring BLINK to life: a program written in Java that, at this moment, has more than 800 hundred classes and more than 70000 lines of code. Today, BLINK supports blinks, g-blink, BFLs and 3-gems. The idea is, in the future, to bring other possible space presentations, like special spines, into it.

To make BLINK a flexible program we decided that its interface would be a *Command Line Interface*. It displays a prompt and the user enters a command or a script written in a *language* that we also name BLINK. Once a command or script has been entered, the program calculates the script result and shows it to the user. The flexibility we get in this type of design is good; for example we can combine functions and easily express more complex functions.

Besides the calculation of invariants, the identification of certain structures into 3-gems (*e.g.* disconnecting quartets, dipoles) or into g-blinks (*e.g.* simplification points) one of the main characteristics of BLINK is its capability of presenting drawings or diagrams for blinks, g-blink, BFLs and 3-gems. Almost all drawings on this thesis came from BLINK. To get good looking and correct drawings for blinks, g-blinks and BFLs took us a long time once we didn't know a good way of doing it. But finally we found a great solution: *Tamassia's Algorithm [**?**]*.

We have implemented the following four algorithms to deal with the drawing issue. Except for the first algorithm, the other three are further fine-tuned with *Bézier curves and splines techniques* ([**?**]) to produce rounded-drawings with curved edges.

1. *Coin-drawing Algorithm:* this was our own first original algorithm which we implemented to correctly draw in a visible scale the whole of any plane graph. The drawing is in the interior of a disk named a *coin*. The coin-drawing algorithm chooses and draw a spanning tree of the graph with appropriate lengths and angles. These ensure that the remaining edges can be displayed as a path which is a line segment, an arc of circle and another line segment. This is the simplest algorithm producing the less pleasing aesthetical effect. Nevertheless, these *coin-drawings* are important because they were, for a long

time in our work, the only general method with total visibility. Figure 6.6 presents an example of our coin drawing algorithm.

2. *Tutte's Barycentric Algorithm [**?**]:* we have implemented this well known algorithm that draws a 3-connected plane graph by choosing the external face and extending the drawing so that every interior vertex is in the barycenter of its neighbors. Frequently, it produces pleasant drawings. However it does not treat the less connected graphs which are central for our work: loops, pendant vertices and cut-vertices are of fundamental importance in blink theory. Another problem that occurs with Tutte's based algorithm is the one of discrepant scales: some parts of the drawing are exponentially smaller that others, and simply disappear from the drawings. Despite of these disadvantages, Tutte's algorithm works well for the majority of blinks in the set U.

3. *Koebe, Andreev and Thurston's Theorem on circle packing in the hyperbolic plane:* beautiful drawings of plane graphs are possible to obtain from the geometry of the hyperbolic plane. Given a 3-connected plane graph, there exist circles centered at the vertices of the graph so that the edges are defined by the contact points of two circles. See the articles of Smith [**?**], Stephenson [**?**] of Collins and Stephenson [**?**] where algorithms are outlined for the case of triangulations. The Theorem yielding the circle packing was proved independently by Koebe [**?**], Andreev [**?**] and by Thurston [**?**]. We have implemented our own version of the algorithm which works in the case of 3-connected graphs. However, it suffers the same disadvantages as Tutte's Algorithm. Nevertheless, when it works it produces the nicest results. Figure 6.7 presents a blink, its BFL, the circle packing that defined the first two drawings, and the first three drawings together.

4. *Tamassia's Algorithm [**?**]: to embed an arbitrary plane graph with valency at most 4 in the rectilinear grid so as to minimize the number of bends.* This algorithm came to our attention only at latter phase of our research. Fine-tunings of it has all the properties we needed: it correctly draws any plane graph and it does not suffer from the undesirable phenomenon of discrepant scales: all the vertices and the edges are entirely well visible. The objective of the method is to minimize (in a precisely defined mathematical way)

5
6
8
9
3
4

Figure 6.7 Circle packing of a 3-connected blink

the number of bends. The algorithm depends three times on the algorithm to compute a minimum cost-flow in a network. The essence of this algorithm is in the design of the first network. Each feasible flow in this network encodes valid "shapes" for the edges of the graph. This encoding tells, for example, that an edge has no bends or that it has one bend to the right then one bend to the left. When a minimum flow is found in this network the minimum number of bends for a valid rectilinear embedding of the given graph is found. The other two networks are used to find the lengths of the horizontal end vertical segments of the edges. In order to have Tamassia's algorithm available, we had first to implement the minimum cost flow algorithm in its full generality via the network simplex method. We have based our implementation on the lucid exposition Chapter 19 of [**?**] and in the (editor's categorization) "Exceptional Paper" [**?**], which is the original source of the network simplex method. Tamassia's algorithm is an unexpected application of network flow theory in its full strength. Since its publication in 1987, it has become a theoretically beautiful at the same time a practical device used on dozens of applications. Having implemented it from scratch, we had the opportunity of tailoring it to fulfill our expectations on drawing of general plane graphs. In particular, the restriction about the maximum degree 4 is easy to overcome. Finally, the use of Bézier curves and splines ([**?**]) makes the drawings more pleasing aesthetically, with smaller perceptual complexity. All drawings in the Appendices are based in this algorithm.

We want to make BLINK an open source project on the internet but this wasn't done yet.

AN EXAMPLE OF BLINK USAGE

We finish this section with an example of the usage of BLINK. Here is the code:

```
// associates B to the g-blink with 4 parallel green edges: U[5]
B = gblink(5)
// all possible toroidal sums with B up to 24 edges
C = combineGBlinks({B},24)
// calculate representative
C = rep(C)
// remove duplicates
C = set(C)
// homology groups on all g-blink of C
HGs = hg(C)
// calculate quantum invariant on all g-blink of C up to level 4
QIs = qi(C,4)
// produces the blink drawings
db(C,cols=10,rows=4.pdf="blinks.pdf")
// produces the link drawings
dl(C,cols=10,rows=4.pdf="links.pdf")
```

The BFL presentation of $U[5]$ is the first in U to have two components. It is a blink with four parallel green edges. By merging $U[5]$ with itself in all possible ways we obtain 38 representative blinks with ≤ 24 edges. These 38 blinks and their associated BFLs are shown in Figure 6.8. We calculated homology group and the quantum invariant up to level 4 of these 38 blinks. We could distinguish 24 spaces. The blinks we cannot distinguish with this experiment are: $\{9,12\}$, $\{10,13\}$, $\{16,27,36\}$, $\{17,19,25,28\}$, $\{18,21,26,29,31\}$, $\{20,24\}$, $\{23,30\}$, $\{32,34\}$.

#	HG	r=3	r=4	#	HG	r=3	r=4
01	2^2	$1.41421+0.00000i$	$1.50000-0.50000i$	20	$(1)2^6$	$8.00000+0.00000i$	$8.00000-14.00000i$
02	$(1)2^2$	$2.00000+0.00000i$	$2.00000-1.00000i$	21	$(1)2^6$	$8.00000+0.00000i$	$10.00000-12.00000i$
03	2^4	$2.82842+0.00000i$	$3.00000-2.00000i$	22	$(1)2^6$	$8.00000+0.00000i$	$6.00000-12.00000i$
04	$(2)2^2$	$2.82842+0.00000i$	$3.00000-1.00000i$	23	$(1)2^6$	$8.00000+0.00000i$	$8.00000-10.00000i$
05	$(1)2^4$	$4.00000+0.00000i$	$5.00000-3.00000i$	24	$(1)2^6$	$8.00000+0.00000i$	$8.00000-14.00000i$
06	$(1)2^4$	$4.00000+0.00000i$	$4.00000-4.00000i$	25	$(1)2^6$	$8.00000+0.00000i$	$8.00000-12.00000i$
07	$(3)2^2$	$4.00000+0.00000i$	$6.00000+0.00000i$	26	$(1)2^6$	$8.00000+0.00000i$	$10.00000-12.00000i$
08	$(2)2^4$	$5.65685+0.00000i$	$8.00000-6.00000i$	27	$(1)2^6$	$8.00000+0.00000i$	$14.00000-12.00000i$
09	2^6	$5.65685+0.00000i$	$7.00000-7.00000i$	28	$(1)2^6$	$8.00000+0.00000i$	$8.00000-12.00000i$
10	$(2)2^4$	$5.65685+0.00000i$	$6.00000-6.00000i$	29	$(1)2^6$	$8.00000+0.00000i$	$10.00000-12.00000i$
11	2^6	$5.65685+0.00000i$	$5.00000-7.00000i$	30	$(1)2^6$	$8.00000+0.00000i$	$8.00000-10.00000i$
12	2^6	$5.65685+0.00000i$	$7.00000-7.00000i$	31	$(1)2^6$	$8.00000+0.00000i$	$10.00000-12.00000i$
13	$(2)2^4$	$5.65685+0.00000i$	$6.00000-6.00000i$	32	$(3)2^4$	$8.00000+0.00000i$	$14.00000-10.00000i$
14	$(2)2^4$	$5.65685+0.00000i$	$10.00000-4.00000i$	33	$(3)2^4$	$8.00000+0.00000i$	$12.00000-8.00000i$
15	$(4)2^2$	$5.65685+0.00000i$	$14.00000+2.00000i$	34	$(3)2^4$	$8.00000+0.00000i$	$14.00000-10.00000i$
16	$(1)2^6$	$8.00000+0.00000i$	$14.00000-12.00000i$	35	$(3)2^4$	$8.00000+0.00000i$	$8.00000-8.00000i$
17	$(1)2^6$	$8.00000+0.00000i$	$8.00000-12.00000i$	36	$(1)2^6$	$8.00000+0.00000i$	$14.00000-12.00000i$
18	$(1)2^6$	$8.00000+0.00000i$	$10.00000-12.00000i$	37	$(3)2^4$	$8.00000+0.00000i$	$22.00000-6.00000i$
19	$(1)2^6$	$8.00000+0.00000i$	$8.00000-12.00000i$	38	$(5)2^2$	$8.00000+0.00000i$	$32.00000+4.00000i$

Observe the curious fact that, except for the first blink, the quantum invariants at level $r=4$ are Gauss integers (*i.e.* $a+bi$ with a,b integers). This type of experiment is very easy to do with BLINK.

6.4 Two final remarks

First. Recently we have extended the U set to blinks with up to 10 edges. The number of blinks was increased from 3437 to 17948. The number of potentially prime classes increased from 487 to 1025. The number of composite classes increased from 14 to 40. We did not attempt the topological classification of the classes 10.__ using 3-gems.

Second. We have a contract with World Scientific Publisher to write a book to be co-authored by S. Lins based on the material of this thesis. The tentative title of this book: *All Shapes of Spaces: a Genealogy of Closed Oriented 3-Manifolds* and it should be finished by the year 2008.

APPENDIX A

The 487 potentially prime spaces in U

We here present the 487 spaces that are "potentially prime" once we could not prove them composite in our tests. One thing is certain, as stated in Theorem 5.3.3: any prime space that can be presented as a blink with ≤ 9 edges induces the same space (modulo orientation) as one and only one of these 487 spaces. Actually there are two points where this last statement may fail: space 9.126 and space 9.199 (although they have the same HGnQI we could not find a proof of homeomorphism between g-blink $U[1563]$ and the other g-blinks in 9.126 and g-blink $U[2165]$ and the others in 9.199). All 3437 g-blinks in U appears in this Appendix or in Appendix B.

The elements of this catalogue are: (1) the space name: 6_7 is a synonym for 6.7; (2) the primality test outcome; (3) the homology group; (4) the number of g-blinks in U that induces this space; (5) number of 3-gems identified in the same ts-class of the minimum 3-gem found for this space: *full* means that all ts-class was identified, *partial* means that we do not know if all ts-class was identified; (6) the minimum blink presentation for this space in set U and also a minimal presentation for this space (this is always true, except for class 6.5 that should be 0.1); (7) the name of the g-blink in U; (8) its number of edges; (9) its number of blocks in the blink presentation (2-connected components); (10) its orientation compared to the orientation of the QI shown: + sign means the same and - sign means different; (11) the corresponding BFL presentation; (12) other g-blinks in the same space; (13) the code of the minimal 3-gem found for this space the code convention is defined in [**?**]; (14) the number of handles (composition with $\mathbb{S}^2 \times \mathbb{S}^1$ and the number of vertices of this 3-gem); (15) the quantum invariant of this space in polar form where the angle is divided by π; (16) the name of this minimal 3-gem in the catalogue of [**?**] when it is present in this catalogue.

The spaces that have integral quantum invariants up to level 12 are: 6.5 ($\mathbb{S}^2 \times \mathbb{S}^1$), 6.8, 6.18

Figure A.1 Elements of catalogue

and 8.32. The spaces that have real but not integral quantum invariant up to level 12 are 1.1, 2.1, 4.4, 6.14, 6.19, 8.58, 8.70, 8.75, 8.76, 8.81, 8.86, 8.87, 8.89, 8.100, 8.102, 8.103, 8.117, 9.23, 9.183. The remaining classes have entries with non-zero imaginary part (*i.e.* $\theta/\pi \notin \{0,1\}$).

1_1 (0) 119 blinks

r_1^2 #ts(full) 1

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	0.000000000	3
05	0.371748034	0.000000000	4
06	0.288675135	0.000000000	5
07	0.231920614	0.000000000	6
08	0.191341716	0.000000000	7
09	0.161229842	0.000000000	8
10	0.138196601	0.000000000	9
11	0.120131166	0.000000000	10
12	0.105662433	0.000000000	11

gem: a
h0 v2 a

U[241] edges: 7 blocks: 2 orient: + U[242] edges: 7 blocks: 2 orient: + U[259] edges: 8 blocks: 3 orient: +

U[123] edges: 7 blocks: 1 orient: + U[240] edges: 8 blocks: 2 orient: + U[261] edges: 8 blocks: 3 orient: +

U[263] edges: 8 blocks: 3 orient: + U[598] edges: 8 blocks: 1 orient: + U[644] edges: 8 blocks: 3 orient: + U[804] edges: 9 blocks: 2 orient: + U[818] edges: 9 blocks: 2 orient: +

U[318] edges: 8 blocks: 2 orient: + U[604] edges: 8 blocks: 1 orient: + U[645] edges: 8 blocks: 3 orient: + U[810] edges: 9 blocks: 2 orient: + U[820] edges: 9 blocks: 2 orient: +

U[432] edges: 8 blocks: 4 orient: + U[636] edges: 8 blocks: 4 orient: + U[708] edges: 8 blocks: 3 orient: + U[817] edges: 9 blocks: 2 orient: + U[822] edges: 9 blocks: 2 orient: +

U[832] edges: 9 blocks: 1 orient: + U[928] edges: 9 blocks: 2 orient: + U[1108] edges: 9 blocks: 1 orient: + U[1142] edges: 9 blocks: 2 orient: + U[1150] edges: 9 blocks: 2 orient: +

U[920] edges: 9 blocks: 2 orient: + U[1002] edges: 9 blocks: 1 orient: + U[1110] edges: 9 blocks: 1 orient: + U[1146] edges: 9 blocks: 2 orient: + U[1153] edges: 9 blocks: 2 orient: +

U[923] edges: 9 blocks: 2 orient: + U[1043] edges: 9 blocks: 2 orient: + U[1111] edges: 9 blocks: 1 orient: + U[1149] edges: 9 blocks: 2 orient: + U[1154] edges: 9 blocks: 2 orient: +

U[1157] edges: 9 blocks: 2 orient: + U[1193] edges: 9 blocks: 3 orient: + U[1257] edges: 9 blocks: 1 orient: + U[1285] edges: 9 blocks: 4 orient: + U[1298] edges: 9 blocks: 4 orient: +

U[1174] edges: 9 blocks: 2 orient: + U[1202] edges: 9 blocks: 1 orient: + U[1275] edges: 9 blocks: 4 orient: + U[1287] edges: 9 blocks: 4 orient: + U[1315] edges: 9 blocks: 5 orient: +

U[1175] edges: 9 blocks: 2 orient: + U[1212] edges: 9 blocks: 1 orient: + U[1278] edges: 9 blocks: 4 orient: + U[1293] edges: 9 blocks: 4 orient: + U[1317] edges: 9 blocks: 5 orient: +

U[1342] edges: 9 blocks: 4 orient: + U[1347] edges: 9 blocks: 4 orient: + U[1354] edges: 9 blocks: 4 orient: + U[1410] edges: 9 blocks: 3 orient: + U[1558] edges: 9 blocks: 1 orient: +

U[1344] edges: 9 blocks: 4 orient: + U[1349] edges: 9 blocks: 4 orient: + U[1390] edges: 9 blocks: 2 orient: + U[1506] edges: 9 blocks: 4 orient: + U[1569] edges: 9 blocks: 2 orient: +

U[1345] edges: 9 blocks: 4 orient: + U[1353] edges: 9 blocks: 4 orient: + U[1406] edges: 9 blocks: 3 orient: + U[1520] edges: 9 blocks: 1 orient: + U[1573] edges: 9 blocks: 2 orient: +

U[1668] edges: 9 blocks: 1 orient: +

U[1697] edges: 9 blocks: 1 orient: +

U[1849] edges: 9 blocks: 2 orient: +

U[1900] edges: 9 blocks: 4 orient: +

U[2012] edges: 9 blocks: 1 orient: +

U[1680] edges: 9 blocks: 2 orient: +

U[1749] edges: 9 blocks: 1 orient: +

U[1898] edges: 9 blocks: 4 orient: +

U[1904] edges: 9 blocks: 4 orient: +

U[2013] edges: 9 blocks: 1 orient: +

U[2076] edges: 9 blocks: 3 orient: +

U[2307] edges: 9 blocks: 3 orient: +

U[2364] edges: 9 blocks: 1 orient: +

U[2414] edges: 9 blocks: 1 orient: +

U[2501] edges: 9 blocks: 1 orient: +

U[2121] edges: 9 blocks: 1 orient: +

U[2313] edges: 9 blocks: 3 orient: +

U[2373] edges: 9 blocks: 1 orient: +

U[2481] edges: 9 blocks: 1 orient: +

U[2506] edges: 9 blocks: 1 orient: +

U[2205] edges: 9 blocks: 2 orient: +

U[2332] edges: 9 blocks: 1 orient: +

U[2374] edges: 9 blocks: 1 orient: +

U[2489] edges: 9 blocks: 1 orient: +

U[2512] edges: 9 blocks: 5 orient: +

U[2517] edges: 9 blocks: 5 orient: +

U[2584] edges: 9 blocks: 3 orient: +

U[2601] edges: 9 blocks: 7 orient: +

U[2640] edges: 9 blocks: 2 orient: +

U[2699] edges: 9 blocks: 3 orient: +

U[2547] edges: 9 blocks: 2 orient: +

U[2586] edges: 9 blocks: 3 orient: +

U[2622] edges: 9 blocks: 3 orient: +

U[2696] edges: 9 blocks: 3 orient: +

U[2700] edges: 9 blocks: 3 orient: +

U[2582] edges: 9 blocks: 3 orient: +

U[2590] edges: 9 blocks: 2 orient: +

U[2623] edges: 9 blocks: 3 orient: +

U[2697] edges: 9 blocks: 3 orient: +

U[2888] edges: 9 blocks: 4 orient: +

U[2912] edges: 9 blocks: 3 orient: +

U[3301] edges: 9 blocks: 3 orient: +

2_1 (0) 2^1 67 blinks

r_1^8 #ts(full) 1

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	2
04	0.382683432	1.000000000	3
05	0.000000000	0.000000000	4
06	0.211324865	0.000000000	5
07	0.000000000	0.000000000	6
08	0.137949690	1.000000000	7
09	0.000000000	0.000000000	8
10	0.098937843	0.000000000	9
11	0.000000000	0.000000000	10
12	0.075359332	1.000000000	11

gem: badc
dcba
h0 v8 cdab

U[2916] edges: 9 blocks: 3 orient: +

U[3394] edges: 9 blocks: 4 orient: +

U[3060] edges: 9 blocks: 1 orient: +

U[2] edges: 2 blocks: 2 orient: +

U[32] edges: 6 blocks: 3 orient: +

U[37] edges: 6 blocks: 1 orient: +

U[73] edges: 7 blocks: 1 orient: +

U[153] edges: 7 blocks: 2 orient: +

U[265] edges: 8 blocks: 3 orient: +

U[329] edges: 8 blocks: 1 orient: +

U[367] edges: 8 blocks: 2 orient: +

U[97] edges: 7 blocks: 3 orient: +

U[258] edges: 8 blocks: 3 orient: +

U[266] edges: 8 blocks: 3 orient: +

U[330] edges: 8 blocks: 1 orient: +

U[368] edges: 8 blocks: 2 orient: +

U[105] edges: 7 blocks: 2 orient: +

U[260] edges: 8 blocks: 3 orient: +

U[283] edges: 8 blocks: 1 orient: +

U[364] edges: 8 blocks: 2 orient: +

U[382] edges: 8 blocks: 2 orient: +

U[463] edges: 8 blocks: 2 orient: +

U[500] edges: 8 blocks: 3 orient: +

U[670] edges: 8 blocks: 2 orient: +

U[1073] edges: 9 blocks: 2 orient: +

U[1292] edges: 9 blocks: 4 orient: +

U[497] edges: 8 blocks: 3 orient: +

U[565] edges: 8 blocks: 3 orient: +

U[709] edges: 8 blocks: 3 orient: +

U[1136] edges: 9 blocks: 3 orient: +

U[1326] edges: 9 blocks: 3 orient: +

U[1328] edges: 9 blocks: 3 orient: +

U[1765] edges: 9 blocks: 2 orient: +

U[1938] edges: 9 blocks: 1 orient: +

U[2085] edges: 9 blocks: 4 orient: +

U[2325] edges: 9 blocks: 1 orient: +

U[1405] edges: 9 blocks: 3 orient: +

U[1780] edges: 9 blocks: 2 orient: +

U[2044] edges: 9 blocks: 1 orient: +

U[2086] edges: 9 blocks: 4 orient: +

U[2511] edges: 9 blocks: 5 orient: +

U[1504] edges: 9 blocks: 4 orient: +

U[1784] edges: 9 blocks: 2 orient: +

U[2084] edges: 9 blocks: 4 orient: +

U[2088] edges: 9 blocks: 4 orient: +

U[2522] edges: 9 blocks: 3 orient: +

U[2525] edges: 9 blocks: 3 orient: +

U[2569] edges: 9 blocks: 1 orient: +

U[2631] edges: 9 blocks: 2 orient: +

U[2780] edges: 9 blocks: 2 orient: +

U[3032] edges: 9 blocks: 4 orient: +

U[2564] edges: 9 blocks: 1 orient: +

U[2609] edges: 9 blocks: 4 orient: +

U[2770] edges: 9 blocks: 2 orient: +

U[2874] edges: 9 blocks: 6 orient: +

U[3279] edges: 9 blocks: 4 orient: +

U[2567] edges: 9 blocks: 1 orient: +

U[2616] edges: 9 blocks: 4 orient: +

U[2778] edges: 9 blocks: 2 orient: +

U[2925] edges: 9 blocks: 2 orient: +

U[3282] edges: 9 blocks: 4 orient: +

U[3296] edges: 9 blocks: 3 orient: +

U[3349] edges: 9 blocks: 4 orient: +

U[3302] edges: 9 blocks: 3 orient: +

U[3304] edges: 9 blocks: 3 orient: +

3_1 (0) 3^1 52 blinks

r_1^{22} #ts(full) 1

r	mod	theta/pi	#sts
03	0.707106781	-0.500000000	2
04	0.500000000	0.250000000	6
05	0.928333668	-0.575632347	10
06	0.500000000	0.500000000	19
07	0.736976229	-0.742116129	28
08	0.844623199	0.375000000	44
09	0.494622939	-0.753479442	60
10	0.861803399	0.151264694	85
11	0.722712934	-0.782796314	110
12	0.612372436	0.000000000	146

gem: cabfdeighkj
ikdcjgfeahb
h0 v22 jehkiadcbfg

U[3] edges: 3 blocks: 1 orient: +

U[33] edges: 6 blocks: 3 orient: +

U[82] edges: 7 blocks: 2 orient: +

U[121] edges: 7 blocks: 1 orient: -

U[212] edges: 8 blocks: 3 orient: +

U[635] edges: 8 blocks: 4 orient: +

U[711] edges: 8 blocks: 3 orient: -

U[1007] edges: 9 blocks: 1 orient: -

U[122] edges: 7 blocks: 1 orient: -

U[319] edges: 8 blocks: 2 orient: +

U[641] edges: 8 blocks: 3 orient: -

U[830] edges: 9 blocks: 1 orient: -

U[1102] edges: 9 blocks: 1 orient: -

U[150] edges: 7 blocks: 2 orient: +

U[504] edges: 8 blocks: 2 orient: +

U[647] edges: 8 blocks: 3 orient: -

U[941] edges: 9 blocks: 2 orient: -

U[1103] edges: 9 blocks: 1 orient: -

U[1148] edges: 9 blocks: 2 orient: -

U[1162] edges: 9 blocks: 2 orient: +

U[1211] edges: 9 blocks: 1 orient: -

U[1241] edges: 9 blocks: 1 orient: +

U[1699] edges: 9 blocks: 2 orient: +

U[1152] edges: 9 blocks: 2 orient: -

U[1176] edges: 9 blocks: 2 orient: -

U[1310] edges: 9 blocks: 2 orient: -

U[1441] edges: 9 blocks: 1 orient: +

U[1766] edges: 9 blocks: 2 orient: +

U[1776] edges: 9 blocks: 2 orient: +

U[2081] edges: 9 blocks: 4 orient: +

U[2370] edges: 9 blocks: 1 orient: +

U[2484] edges: 9 blocks: 1 orient: -

U[3009] edges: 9 blocks: 3 orient: -

U[1778] edges: 9 blocks: 2 orient: +

U[2232] edges: 9 blocks: 2 orient: -

U[2448] edges: 9 blocks: 1 orient: +

U[2580] edges: 9 blocks: 3 orient: -

U[3149] edges: 9 blocks: 4 orient: +

U[1785] edges: 9 blocks: 2 orient: -

U[2369] edges: 9 blocks: 1 orient: +

U[2449] edges: 9 blocks: 1 orient: +

U[2585] edges: 9 blocks: 3 orient: +

U[3155] edges: 9 blocks: 4 orient: +

U[3157] edges: 9 blocks: 4 orient: -

U[3245] edges: 9 blocks: 3 orient: -

U[3194] edges: 9 blocks: 3 orient: -

U[3243] edges: 9 blocks: 3 orient: +

3_2 (0) 3^1 65 blinks

r_1^{12} #ts(full) 1

r	mod	theta/pi	#sts
03	0.707106781	-0.500000000	2
04	0.500000000	-0.750000000	3
05	0.601500955	0.900000000	4
06	0.500000000	0.500000000	5
07	0.417906506	0.214285714	6
08	0.461939766	-0.125000000	7
09	0.408248290	-0.500000000	8
10	0.361803399	-0.800000000	9
11	0.387868386	0.863636364	10
12	0.353553391	0.500000000	11

gem: cabfde
fedcba
h0 v12 edfbac

U[4] edges: 3 blocks: 3 orient: +

U[26] edges: 6 blocks: 1 orient: -

U[50] edges: 6 blocks: 5 orient: -

U[85] edges: 7 blocks: 2 orient: -

U[209] edges: 8 blocks: 3 orient: -

U[404] edges: 8 blocks: 2 orient: +

U[540] edges: 8 blocks: 1 orient: +

U[811] edges: 9 blocks: 2 orient: -

U[120] edges: 7 blocks: 1 orient: +

U[241] edges: 8 blocks: 2 orient: -

U[409] edges: 8 blocks: 5 orient: -

U[605] edges: 8 blocks: 1 orient: -

U[821] edges: 9 blocks: 2 orient: -

U[173] edges: 7 blocks: 2 orient: +

U[315] edges: 8 blocks: 2 orient: +

U[430] edges: 8 blocks: 4 orient: -

U[726] edges: 8 blocks: 3 orient: +

U[901] edges: 9 blocks: 1 orient: +

U[938] edges: 9 blocks: 2 orient: -

U[1048] edges: 9 blocks: 2 orient: +

U[1145] edges: 9 blocks: 2 orient: +

U[1159] edges: 9 blocks: 2 orient: -

U[1267] edges: 9 blocks: 1 orient: +

U[943] edges: 9 blocks: 2 orient: +

U[1101] edges: 9 blocks: 1 orient: +

U[1147] edges: 9 blocks: 2 orient: +

U[1160] edges: 9 blocks: 2 orient: -

U[1281] edges: 9 blocks: 4 orient: -

U[1033] edges: 9 blocks: 1 orient: -

U[1144] edges: 9 blocks: 2 orient: +

U[1158] edges: 9 blocks: 2 orient: -

U[1243] edges: 9 blocks: 1 orient: +

U[1286] edges: 9 blocks: 4 orient: +

U[1313] edges: 9 blocks: 5 orient: +

U[1419] edges: 9 blocks: 1 orient: +

U[1650] edges: 9 blocks: 1 orient: +

U[1854] edges: 9 blocks: 2 orient: -

U[2087] edges: 9 blocks: 4 orient: -

U[1350] edges: 9 blocks: 4 orient: -

U[1490] edges: 9 blocks: 2 orient: +

U[1679] edges: 9 blocks: 2 orient: +

U[1897] edges: 9 blocks: 4 orient: +

U[2219] edges: 9 blocks: 1 orient: +

U[2450] edges: 9 blocks: 1 orient: -

U[2581] edges: 9 blocks: 3 orient: +

U[2698] edges: 9 blocks: 3 orient: +

U[2761] edges: 9 blocks: 1 orient: -

U[2910] edges: 9 blocks: 3 orient: -

U[2493] edges: 9 blocks: 1 orient: +

U[2694] edges: 9 blocks: 3 orient: +

U[2738] edges: 9 blocks: 2 orient: -

U[2890] edges: 9 blocks: 4 orient: +

U[2938] edges: 9 blocks: 3 orient: +

U[2579] edges: 9 blocks: 3 orient: +

U[2695] edges: 9 blocks: 3 orient: +

U[2754] edges: 9 blocks: 1 orient: +

U[2901] edges: 9 blocks: 5 orient: +

U[2944] edges: 9 blocks: 1 orient: +

U[3049] edges: 9 blocks: 2 orient: +

U[3303] edges: 9 blocks: 3 orient: +

4_1 (0) 2^2 24 blinks

r_1^{18} #ts(full) 1

r	mod	theta/pi	#sts
03	1.414213562	0.000000000	4
04	1.581138830	-0.102416382	16
05	1.597744161	-0.254068341	44
06	1.527525232	-0.439481141	107
07	1.429200068	-0.653089436	224
08	1.354911967	-0.889255678	432
09	1.334545109	0.862553511	768
10	1.363216495	0.614494597	1293
11	1.411622354	0.372937200	2068
12	1.449580121	0.137205455	3184

gem: h0 v18
```
cabfdeigh
ihdcbgfea
gfhaibdce
```

U[5] edges: 4 blocks: 1 orient: +

U[343] edges: 8 blocks: 3 orient: -

U[204] edges: 8 blocks: 1 orient: -

U[349] edges: 8 blocks: 3 orient: -

U[270] edges: 8 blocks: 1 orient: +

U[351] edges: 8 blocks: 1 orient: -

U[511] edges: 8 blocks: 1 orient: +

U[790] edges: 9 blocks: 1 orient: +

U[1600] edges: 9 blocks: 2 orient: +

U[1923] edges: 9 blocks: 2 orient: +

U[2021] edges: 9 blocks: 3 orient: +

U[621] edges: 8 blocks: 1 orient: -

U[1219] edges: 9 blocks: 2 orient: +

U[1607] edges: 9 blocks: 2 orient: -

U[1950] edges: 9 blocks: 1 orient: +

U[2027] edges: 9 blocks: 3 orient: +

U[762] edges: 8 blocks: 3 orient: -

U[1295] edges: 9 blocks: 4 orient: -

U[1610] edges: 9 blocks: 2 orient: +

U[1953] edges: 9 blocks: 1 orient: -

U[2317] edges: 9 blocks: 2 orient: -

U[2911] edges: 9 blocks: 3 orient: -

U[2915] edges: 9 blocks: 3 orient: -

U[2917] edges: 9 blocks: 3 orient: -

4_2 (0) 4^1 49 blinks

r_4^{20} #ts(full) 1

r	mod	theta/pi	#sts
03	1.000000000	-0.250000000	2
04	0.707106781	-0.875000000	6
05	1.129775731	0.504068341	10
06	1.154700538	0.000000000	19
07	0.870794262	-0.655400321	28
08	1.118033989	0.664916382	44
09	1.139911922	0.105463741	60
10	0.867632644	-0.563081267	85
11	1.050592088	0.733235861	110
12	1.080123450	0.147814474	146

gem: h0 v20
```
cabfdehgji
hjdcbifage
ifgahbjedc
```

U[6] edges: 4 blocks: 2 orient: +

U[80] edges: 7 blocks: 1 orient: +

U[9] edges: 4 blocks: 1 orient: -

U[102] edges: 7 blocks: 2 orient: -

U[13] edges: 5 blocks: 2 orient: +

U[141] edges: 7 blocks: 2 orient: -

U[252] edges: 8 blocks: 3 orient: +
U[358] edges: 8 blocks: 1 orient: -
U[428] edges: 8 blocks: 3 orient: +
U[549] edges: 8 blocks: 3 orient: -
U[728] edges: 8 blocks: 3 orient: +

U[331] edges: 8 blocks: 1 orient: -
U[359] edges: 8 blocks: 1 orient: +
U[455] edges: 8 blocks: 2 orient: -
U[668] edges: 8 blocks: 2 orient: -
U[799] edges: 9 blocks: 2 orient: -

U[950] edges: 9 blocks: 1 orient: +
U[1123] edges: 9 blocks: 1 orient: -
U[1236] edges: 9 blocks: 1 orient: -
U[1606] edges: 9 blocks: 2 orient: -
U[2018] edges: 9 blocks: 3 orient: +

U[981] edges: 9 blocks: 1 orient: -
U[1180] edges: 9 blocks: 1 orient: -
U[1576] edges: 9 blocks: 2 orient: -
U[1871] edges: 9 blocks: 2 orient: +
U[2204] edges: 9 blocks: 2 orient: -

U[1090] edges: 9 blocks: 2 orient: +
U[1235] edges: 9 blocks: 1 orient: -
U[1599] edges: 9 blocks: 2 orient: -
U[1880] edges: 9 blocks: 2 orient: -
U[2241] edges: 9 blocks: 1 orient: +

U[2361] edges: 9 blocks: 2 orient: +
U[2398] edges: 9 blocks: 1 orient: +
U[2615] edges: 9 blocks: 4 orient: -
U[2779] edges: 9 blocks: 2 orient: +
U[3415] edges: 9 blocks: 4 orient: -

U[2381] edges: 9 blocks: 1 orient: +
U[2533] edges: 9 blocks: 3 orient: +
U[2661] edges: 9 blocks: 2 orient: -
U[2936] edges: 9 blocks: 3 orient: +

U[2395] edges: 9 blocks: 1 orient: -
U[2610] edges: 9 blocks: 4 orient: -
U[2665] edges: 9 blocks: 2 orient: +
U[3270] edges: 9 blocks: 5 orient: +

4_3 (0) 2^1 34 blinks

r_{28}^{24} #ts(full) 1

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	2
04	0.923879533	-0.500000000	6
05	0.000000000	0.000000000	10
06	0.912870929	0.602416382	19
07	0.000000000	0.000000000	28
08	0.919603642	-0.390497222	44
09	0.000000000	0.000000000	60
10	0.932508312	0.580136286	85
11	0.000000000	0.000000000	110
12	0.947247195	-0.466656034	146

gem: dabcgefjhilk
jiledchgkabf
h0 v24 kfhjibacelgd

U[7] edges: 4 blocks: 2 orient: +
U[106] edges: 7 blocks: 2 orient: -
U[154] edges: 7 blocks: 2 orient: -

U[36] edges: 6 blocks: 1 orient: +
U[126] edges: 7 blocks: 4 orient: +
U[253] edges: 8 blocks: 3 orient: +

U[75] edges: 7 blocks: 1 orient: +
U[130] edges: 7 blocks: 4 orient: +
U[254] edges: 8 blocks: 3 orient: +

U[326] edges: 8 blocks: 1 orient: -
U[424] edges: 8 blocks: 3 orient: +
U[545] edges: 8 blocks: 3 orient: +
U[1356] edges: 9 blocks: 3 orient: +
U[1813] edges: 9 blocks: 2 orient: +

U[362] edges: 8 blocks: 2 orient: -
U[425] edges: 8 blocks: 3 orient: +
U[666] edges: 8 blocks: 2 orient: -
U[1482] edges: 9 blocks: 4 orient: +
U[1840] edges: 9 blocks: 2 orient: -

U[363] edges: 8 blocks: 2 orient: -
U[458] edges: 8 blocks: 2 orient: -
U[1137] edges: 9 blocks: 3 orient: +
U[1633] edges: 9 blocks: 2 orient: +
U[1878] edges: 9 blocks: 2 orient: +

U[2323] edges: 9 blocks: 1 orient: + U[2606] edges: 9 blocks: 4 orient: + U[3026] edges: 9 blocks: 4 orient: +

U[2350] edges: 9 blocks: 2 orient: + U[2628] edges: 9 blocks: 2 orient: + U[3186] edges: 9 blocks: 2 orient: +

4_4 (1) 28 blinks

r_5^{28} #ts(full) 6

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	0.000000000	0.000000000	6
05	0.618033989	1.000000000	10
06	0.000000000	0.000000000	19
07	1.000000000	0.000000000	28
08	1.000000000	0.000000000	44
09	0.000000000	0.000000000	60
10	0.618033989	1.000000000	85
11	0.000000000	0.000000000	110
12	1.000000000	0.000000000	146

gem: cabfdeighljknm
imlckgfenbhdja
h0 v28 kenmbjlcfiagdh

U[8] edges: 4 blocks: 1 orient: + U[142] edges: 7 blocks: 2 orient: + U[328] edges: 8 blocks: 1 orient: +

U[45] edges: 6 blocks: 2 orient: + U[187] edges: 7 blocks: 3 orient: + U[355] edges: 8 blocks: 1 orient: +

U[136] edges: 7 blocks: 3 orient: + U[327] edges: 8 blocks: 1 orient: + U[356] edges: 8 blocks: 1 orient: +

U[560] edges: 8 blocks: 3 orient: + U[982] edges: 9 blocks: 1 orient: + U[1572] edges: 9 blocks: 2 orient: + U[2458] edges: 9 blocks: 1 orient: + U[2607] edges: 9 blocks: 4 orient: +

U[561] edges: 8 blocks: 3 orient: + U[1084] edges: 9 blocks: 2 orient: + U[1907] edges: 9 blocks: 2 orient: + U[2530] edges: 9 blocks: 3 orient: + U[2660] edges: 9 blocks: 2 orient: +

U[845] edges: 9 blocks: 1 orient: + U[1411] edges: 9 blocks: 3 orient: + U[2208] edges: 9 blocks: 2 orient: + U[2534] edges: 9 blocks: 3 orient: + U[2703] edges: 9 blocks: 1 orient: +

U[2775] edges: 9 blocks: 2 orient: + U[3280] edges: 9 blocks: 4 orient: +

U[2894] edges: 9 blocks: 3 orient: +

U[2937] edges: 9 blocks: 3 orient: +

4_5 (0) 4^1 58 blinks

r_2^{16} #ts(full) 2

r	mod	theta/pi	#sts
03	1.000000000	-0.250000000	2
04	0.707106781	-0.375000000	3
05	0.525731112	-0.350000000	4
06	0.577350269	-0.333333333	5
07	0.591009048	-0.392857143	6
08	0.500000000	-0.437500000	7
09	0.428525073	-0.416666667	8
10	0.447213595	-0.400000000	9
11	0.455734141	-0.431818182	10
12	0.408248290	-0.458333333	11

gem: cabfdehg
hedcbgfa
h0 v16 gfeahbdc

U[10] edges: 4 blocks: 4 orient: +

U[12] edges: 5 blocks: 2 orient: -

U[17] edges: 5 blocks: 1 orient: -

U[104] edges: 7 blocks: 2 orient: + U[250] edges: 8 blocks: 1 orient: - U[338] edges: 8 blocks: 6 orient: + U[558] edges: 8 blocks: 3 orient: - U[694] edges: 8 blocks: 5 orient: -

U[108] edges: 7 blocks: 2 orient: - U[262] edges: 8 blocks: 3 orient: - U[361] edges: 8 blocks: 2 orient: + U[564] edges: 8 blocks: 3 orient: + U[707] edges: 8 blocks: 3 orient: -

U[181] edges: 7 blocks: 2 orient: + U[264] edges: 8 blocks: 3 orient: + U[427] edges: 8 blocks: 3 orient: - U[578] edges: 8 blocks: 1 orient: + U[748] edges: 8 blocks: 3 orient: +

U[966] edges: 9 blocks: 2 orient: -

U[1088] edges: 9 blocks: 2 orient: -

U[1186] edges: 9 blocks: 1 orient: +

U[1311] edges: 9 blocks: 2 orient: -

U[1392] edges: 9 blocks: 2 orient: +

U[968] edges: 9 blocks: 2 orient: -

U[1134] edges: 9 blocks: 3 orient: +

U[1187] edges: 9 blocks: 1 orient: +

U[1386] edges: 9 blocks: 2 orient: +

U[1577] edges: 9 blocks: 2 orient: +

U[1596] edges: 9 blocks: 2 orient: +

U[1820] edges: 9 blocks: 2 orient: -

U[2007] edges: 9 blocks: 2 orient: -

U[2042] edges: 9 blocks: 1 orient: +

U[2470] edges: 9 blocks: 1 orient: -

U[1601] edges: 9 blocks: 2 orient: +

U[1936] edges: 9 blocks: 1 orient: +

U[2020] edges: 9 blocks: 3 orient: -

U[2112] edges: 9 blocks: 1 orient: +

U[2472] edges: 9 blocks: 1 orient: -

U[1799] edges: 9 blocks: 1 orient: -

U[1962] edges: 9 blocks: 1 orient: -

U[2040] edges: 9 blocks: 1 orient: +

U[2355] edges: 9 blocks: 2 orient: -

U[2531] edges: 9 blocks: 3 orient: +

U[2571] edges: 9 blocks: 1 orient: +

U[2618] edges: 9 blocks: 4 orient: -

U[2714] edges: 9 blocks: 1 orient: +

U[2993] edges: 9 blocks: 1 orient: -

U[2599] edges: 9 blocks: 7 orient: -

U[2664] edges: 9 blocks: 2 orient: -

U[2819] edges: 9 blocks: 1 orient: +

U[2612] edges: 9 blocks: 4 orient: +

U[2713] edges: 9 blocks: 1 orient: +

U[2992] edges: 9 blocks: 1 orient: -

5_1 (0) 5^1 18 blinks

$r_?^{32}$ #ts(full) 8

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	-0.500000000	18
05	0.000000000	0.000000000	34
06	0.288675135	1.000000000	115
07	1.032991532	0.728089655	196
08	0.844623199	0.250000000	452
09	0.562464454	-0.253479442	708
10	0.000000000	0.000000000	1333
11	0.438824819	-0.975425586	1958
12	1.024616848	0.662268765	3254

gem: dabcgefjhilknmpo
jmoedchgpniblafk
h0 v32 ejimpdkocbgnfhla

U[11] edges: 5 blocks: 1 orient: +

U[936] edges: 9 blocks: 2 orient: +

U[1516] edges: 9 blocks: 1 orient: -

U[115] edges: 7 blocks: 1 orient: -

U[1032] edges: 9 blocks: 1 orient: +

U[1994] edges: 9 blocks: 1 orient: +

U[827] edges: 9 blocks: 1 orient: -

U[1440] edges: 9 blocks: 1 orient: -

U[2009] edges: 9 blocks: 1 orient: +

U[2010] edges: 9 blocks: 1 orient: +

U[2368] edges: 9 blocks: 1 orient: -

U[2731] edges: 9 blocks: 3 orient: +

U[2213] edges: 9 blocks: 1 orient: -

U[2446] edges: 9 blocks: 1 orient: +

U[2742] edges: 9 blocks: 2 orient: -

U[2340] edges: 9 blocks: 1 orient: +

U[2447] edges: 9 blocks: 1 orient: +

U[3070] edges: 9 blocks: 1 orient: +

5_2 (0) 5^1 23 blinks

$r_?^{32}$ #ts(full) 157

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	-0.500000000	10
05	0.437016024	-0.300000000	18
06	0.288675135	1.000000000	45
07	0.634884924	-0.622092998	72
08	0.079256334	0.250000000	136
09	0.622390501	0.879092792	200
10	0.190983006	0.600000000	325
11	0.747476909	0.576933520	450
12	0.198687476	0.872714795	666

gem: cabfdeighljknmpo
ipncjgfelhmaodkb
h0 v32 pnikgbedoahmlfcj

U[392] edges: 7 blocks: 1 orient: + U[383] edges: 8 blocks: 2 orient: + U[705] edges: 8 blocks: 3 orient: +

U[109] edges: 7 blocks: 2 orient: + U[460] edges: 8 blocks: 2 orient: - U[998] edges: 9 blocks: 1 orient: -

U[1098] edges: 9 blocks: 1 orient: + U[1166] edges: 9 blocks: 1 orient: + U[1438] edges: 9 blocks: 1 orient: + U[2366] edges: 9 blocks: 1 orient: - U[2491] edges: 9 blocks: 1 orient: +

U[1099] edges: 9 blocks: 1 orient: + U[1167] edges: 9 blocks: 1 orient: + U[1652] edges: 9 blocks: 1 orient: + U[2367] edges: 9 blocks: 1 orient: - U[3412] edges: 9 blocks: 5 orient: +

U[1100] edges: 9 blocks: 1 orient: + U[1437] edges: 9 blocks: 1 orient: + U[2011] edges: 9 blocks: 1 orient: + U[2451] edges: 9 blocks: 1 orient: -

5_3 (0) 63 blinks

r_{172}^{28} #ts(full) 6

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	1.000000000	10
05	0.798872080	-0.854068341	18
06	0.288675135	0.000000000	45
07	0.939027395	0.285714286	72
08	0.191341716	0.500000000	136
09	0.883936202	-0.464314927	200
10	0.638196601	-0.291863317	325
11	0.546676688	0.732882109	450
12	0.809630852	0.927420481	666

gem: dabcgefjhilknm
jlmedchgnaibfk
h0 v28 nfikmjaecbdhlg

U[15] edges: 5 blocks: 1 orient: + U[119] edges: 7 blocks: 1 orient: - U[313] edges: 8 blocks: 2 orient: +

U[20] edges: 5 blocks: 2 orient: - U[195] edges: 7 blocks: 5 orient: + U[316] edges: 8 blocks: 2 orient: -

U[43] edges: 6 blocks: 2 orient: - U[225] edges: 8 blocks: 1 orient: + U[461] edges: 8 blocks: 2 orient: +

U[503] edges: 8 blocks: 2 orient: - U[594] edges: 8 blocks: 2 orient: - U[652] edges: 8 blocks: 3 orient: - U[703] edges: 8 blocks: 4 orient: + U[1097] edges: 9 blocks: 1 orient: -

U[544] edges: 8 blocks: 3 orient: - U[642] edges: 8 blocks: 3 orient: + U[653] edges: 8 blocks: 3 orient: - U[1031] edges: 9 blocks: 1 orient: + U[1106] edges: 9 blocks: 1 orient: +

U[553] edges: 8 blocks: 3 orient: - U[643] edges: 8 blocks: 3 orient: - U[702] edges: 8 blocks: 4 orient: - U[1039] edges: 9 blocks: 1 orient: - U[1107] edges: 9 blocks: 1 orient: +

U[1109] edges: 9 blocks: 1 orient: + U[1161] edges: 9 blocks: 2 orient: - U[1170] edges: 9 blocks: 1 orient: + U[1301] edges: 9 blocks: 2 orient: + U[1397] edges: 9 blocks: 1 orient: +

U[1141] edges: 9 blocks: 2 orient: - U[1163] edges: 9 blocks: 2 orient: + U[1172] edges: 9 blocks: 2 orient: - U[1303] edges: 9 blocks: 2 orient: - U[1501] edges: 9 blocks: 4 orient: -

U[1143] edges: 9 blocks: 2 orient: - U[1169] edges: 9 blocks: 1 orient: + U[1173] edges: 9 blocks: 2 orient: - U[1346] edges: 9 blocks: 4 orient: - U[1502] edges: 9 blocks: 4 orient: -

U[1704] edges: 9 blocks: 1 orient: +

U[1844] edges: 9 blocks: 2 orient: +

U[2083] edges: 9 blocks: 4 orient: -

U[2371] edges: 9 blocks: 1 orient: -

U[2589] edges: 9 blocks: 2 orient: -

U[1835] edges: 9 blocks: 2 orient: +

U[1852] edges: 9 blocks: 2 orient: -

U[2217] edges: 9 blocks: 1 orient: +

U[2372] edges: 9 blocks: 1 orient: -

U[2637] edges: 9 blocks: 2 orient: -

U[2658] edges: 9 blocks: 2 orient: -

U[2898] edges: 9 blocks: 4 orient: -

U[3240] edges: 9 blocks: 3 orient: -

U[2691] edges: 9 blocks: 3 orient: -

U[3208] edges: 9 blocks: 4 orient: -

U[3353] edges: 9 blocks: 4 orient: -

U[2799] edges: 9 blocks: 2 orient: -

U[3236] edges: 9 blocks: 3 orient: +

U[3436] edges: 9 blocks: 6 orient: +

5_4 (1) 48 blinks

r^{26}_{31} #ts(full) 2

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	4
04	0.000000000	0.000000000	16
05	1.000000000	0.600000000	44
06	1.000000000	0.333333333	107
07	0.000000000	0.000000000	224
08	1.000000000	0.750000000	432
09	1.000000000	0.444444444	768
10	0.000000000	0.000000000	1293
11	1.000000000	0.818181818	2068
12	1.000000000	0.500000000	3184

gem: dabcgefihkjml
ijmedckgalhbf
h0 v26 lfhkjbaceimgd

U[16] edges: 5 blocks: 1 orient: +

U[133] edges: 7 blocks: 3 orient: +

U[426] edges: 8 blocks: 3 orient: +

U[562] edges: 8 blocks: 3 orient: -

U[851] edges: 9 blocks: 1 orient: -

U[62] edges: 6 blocks: 4 orient: -

U[143] edges: 7 blocks: 2 orient: +

U[557] edges: 8 blocks: 3 orient: +

U[729] edges: 8 blocks: 3 orient: +

U[978] edges: 9 blocks: 1 orient: +

U[103] edges: 7 blocks: 2 orient: -

U[257] edges: 8 blocks: 3 orient: +

U[559] edges: 8 blocks: 3 orient: +

U[782] edges: 8 blocks: 5 orient: -

U[1129] edges: 9 blocks: 3 orient: -

U[1135] edges: 9 blocks: 3 orient: -

U[1233] edges: 9 blocks: 1 orient: -

U[1575] edges: 9 blocks: 2 orient: -

U[1893] edges: 9 blocks: 1 orient: -

U[2278] edges: 9 blocks: 1 orient: +

U[1181] edges: 9 blocks: 1 orient: -

U[1408] edges: 9 blocks: 3 orient: +

U[1815] edges: 9 blocks: 2 orient: +

U[2192] edges: 9 blocks: 1 orient: +

U[2356] edges: 9 blocks: 2 orient: +

U[1182] edges: 9 blocks: 1 orient: -

U[1524] edges: 9 blocks: 2 orient: +

U[1833] edges: 9 blocks: 1 orient: -

U[2193] edges: 9 blocks: 1 orient: +

U[2391] edges: 9 blocks: 1 orient: +

U[2392] edges: 9 blocks: 1 orient: +

U[2645] edges: 9 blocks: 1 orient: -

U[2701] edges: 9 blocks: 2 orient: -

U[2933] edges: 9 blocks: 2 orient: +

U[3174] edges: 9 blocks: 3 orient: +

U[2469] edges: 9 blocks: 1 orient: +

U[2668] edges: 9 blocks: 2 orient: -

U[2717] edges: 9 blocks: 1 orient: -

U[3147] edges: 9 blocks: 4 orient: +

U[3183] edges: 9 blocks: 2 orient: +

U[2535] edges: 9 blocks: 3 orient: -

U[2685] edges: 9 blocks: 1 orient: +

U[2932] edges: 9 blocks: 2 orient: +

U[3164] edges: 9 blocks: 4 orient: +

U[3239] edges: 9 blocks: 3 orient: +

U[3327] edges: 9 blocks: 6 orient: -

U[3331] edges: 9 blocks: 6 orient: -

5_5 (0) 5^1 55 blinks

r_2^{20} #ts(full) 5

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	-0.500000000	6
05	0.707106781	-0.700000000	10
06	0.288675135	1.000000000	19
07	0.521120889	0.428571429	28
08	0.461939766	0.250000000	44
09	0.303012985	-0.333333333	60
10	0.500000000	-0.600000000	85
11	0.230530019	-0.909090909	110
12	0.394337567	0.500000000	146

gem: cabfdehgji
hjdcbifage
h0 v20 gfeicbjdha

U[21] edges: 5 blocks: 2 orient: +

U[30] edges: 6 blocks: 3 orient: +

U[22] edges: 5 blocks: 5 orient: -

U[210] edges: 8 blocks: 3 orient: +

U[317] edges: 8 blocks: 2 orient: -

U[939] edges: 9 blocks: 2 orient: +

U[1037] edges: 9 blocks: 1 orient: -

U[1151] edges: 9 blocks: 2 orient: +

U[1177] edges: 9 blocks: 2 orient: +

U[648] edges: 8 blocks: 3 orient: -

U[940] edges: 9 blocks: 2 orient: +

U[1038] edges: 9 blocks: 1 orient: +

U[1156] edges: 9 blocks: 2 orient: -

U[1306] edges: 9 blocks: 2 orient: -

U[651] edges: 8 blocks: 3 orient: -

U[942] edges: 9 blocks: 2 orient: -

U[1105] edges: 9 blocks: 1 orient: +

U[1168] edges: 9 blocks: 1 orient: +

U[1340] edges: 9 blocks: 4 orient: +

U[1348] edges: 9 blocks: 4 orient: -

U[1546] edges: 9 blocks: 1 orient: +

U[1901] edges: 9 blocks: 4 orient: -

U[2080] edges: 9 blocks: 4 orient: +

U[2445] edges: 9 blocks: 1 orient: +

U[1352] edges: 9 blocks: 4 orient: +

U[1772] edges: 9 blocks: 2 orient: +

U[1903] edges: 9 blocks: 4 orient: +

U[2290] edges: 9 blocks: 2 orient: +

U[2577] edges: 9 blocks: 3 orient: -

U[1396] edges: 9 blocks: 1 orient: -

U[1787] edges: 9 blocks: 2 orient: +

U[2049] edges: 9 blocks: 5 orient: +

U[2291] edges: 9 blocks: 2 orient: -

U[2583] edges: 9 blocks: 3 orient: -

U[2591] edges: 9 blocks: 2 orient: +

U[2624] edges: 9 blocks: 3 orient: -

U[2935] edges: 9 blocks: 3 orient: +

U[3209] edges: 9 blocks: 4 orient: -

U[3297] edges: 9 blocks: 3 orient: -

U[2600] edges: 9 blocks: 7 orient: -

U[2625] edges: 9 blocks: 3 orient: -

U[3153] edges: 9 blocks: 4 orient: +

U[3241] edges: 9 blocks: 3 orient: -

U[3305] edges: 9 blocks: 3 orient: -

U[2620] edges: 9 blocks: 3 orient: -

U[2692] edges: 9 blocks: 3 orient: -

U[3207] edges: 9 blocks: 4 orient: +

U[3246] edges: 9 blocks: 3 orient: +

U[3306] edges: 9 blocks: 3 orient: -

U[3311] edges: 9 blocks: 3 orient: -

U[3395] edges: 9 blocks: 4 orient: -

U[3342] edges: 9 blocks: 4 orient: +

U[3352] edges: 9 blocks: 4 orient: +

5_6 (0) 37 blinks

r_2^{24} #ts(full) 1

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	1.000000000	6
05	0.973248989	0.600000000	10
06	0.288675135	0.000000000	19
07	0.847218868	0.983166650	28
08	0.732537816	0.500000000	44
09	0.438932487	-0.631428270	60
10	0.947213595	0.800000000	85
11	0.337891504	0.152476184	110
12	0.809630852	-0.927420481	146

gem: cabfdeighljk
ikdcbgfjlhea
h0 v24 jhgliakbefcd

U[19] edges: 5 blocks: 3 orient: +

U[27] edges: 6 blocks: 1 orient: -

U[42] edges: 6 blocks: 2 orient: +

U[151] edges: 7 blocks: 2 orient: +

U[381] edges: 8 blocks: 2 orient: +

U[698] edges: 8 blocks: 3 orient: -

U[1140] edges: 9 blocks: 2 orient: -

U[1329] edges: 9 blocks: 3 orient: +

U[197] edges: 7 blocks: 4 orient: -

U[600] edges: 8 blocks: 1 orient: +

U[1034] edges: 9 blocks: 1 orient: +

U[1164] edges: 9 blocks: 2 orient: +

U[1343] edges: 9 blocks: 4 orient: +

U[1399] edges: 9 blocks: 1 orient: -

U[1500] edges: 9 blocks: 4 orient: +

U[2050] edges: 9 blocks: 5 orient: +

U[2587] edges: 9 blocks: 3 orient: +

U[2897] edges: 9 blocks: 4 orient: +

U[1401] edges: 9 blocks: 1 orient: -

U[1769] edges: 9 blocks: 2 orient: +

U[2082] edges: 9 blocks: 4 orient: +

U[2621] edges: 9 blocks: 3 orient: -

U[3011] edges: 9 blocks: 3 orient: -

U[1421] edges: 9 blocks: 1 orient: -

U[1783] edges: 9 blocks: 2 orient: +

U[2288] edges: 9 blocks: 2 orient: +

U[2693] edges: 9 blocks: 3 orient: -

U[3151] edges: 9 blocks: 4 orient: +

U[3298] edges: 9 blocks: 3 orient: -

U[3312] edges: 9 blocks: 3 orient: +

U[3299] edges: 9 blocks: 3 orient: -

U[3300] edges: 9 blocks: 3 orient: -

6_1 (0) 3^2 7 blinks

r_{36}^{28} #ts(full) 5

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	40
05	0.798872081	0.254068341	140
06	0.866025404	0.000000000	515
07	0.689972794	-0.201069307	1376
08	0.191341716	0.000000000	3504
09	0.550031434	-0.222222222	7680
10	0.638196601	-0.508136683	16005
11	0.521299704	-0.984214641	30580
12	0.183012702	1.000000000	56056

gem: dabcgefjhilknm
gmhldiacnkjebf
h0 v28 keminalgdcfhjb

U[23] edges: 6 blocks: 1 orient: +

U[334] edges: 8 blocks: 1 orient: -

U[877] edges: 9 blocks: 1 orient: +

U[2593] edges: 9 blocks: 4 orient: -

U[3006] edges: 9 blocks: 2 orient: +

U[2883] edges: 9 blocks: 3 orient: -

U[2955] edges: 9 blocks: 1 orient: -

6_2 (0) 3^1 16 blinks

r_{12}^{28} #ts(full) 3

r	mod	theta/pi	#sts
03	0.707106781	-0.500000000	4
04	0.500000000	0.250000000	18
05	0.601500955	-0.300000000	56
06	0.500000000	0.500000000	153
07	0.915772071	-0.007983979	360
08	0.079256334	-0.625000000	772
09	0.767255812	0.166666667	1516
10	0.361803399	-0.400000000	2797
11	0.734443654	0.478491617	4872
12	0.612372436	0.000000000	8118

gem: cabfdeighljknm
indcmgflkeahjb
h0 v28 negmhalbjidckf

U[24] edges: 6 blocks: 1 orient: +

U[179] edges: 7 blocks: 3 orient: +

U[224] edges: 8 blocks: 1 orient: -

U[247] edges: 8 blocks: 1 orient: -

U[457] edges: 8 blocks: 2 orient: -

U[2576] edges: 9 blocks: 3 orient: +

U[2690] edges: 9 blocks: 3 orient: +

U[3295] edges: 9 blocks: 3 orient: +

U[314] edges: 8 blocks: 2 orient: +

U[606] edges: 8 blocks: 1 orient: -

U[2619] edges: 9 blocks: 3 orient: +

U[2730] edges: 9 blocks: 3 orient: +

U[386] edges: 8 blocks: 2 orient: +

U[701] edges: 8 blocks: 4 orient: +

U[2657] edges: 9 blocks: 2 orient: +

U[2798] edges: 9 blocks: 2 orient: +

6_3 (0) 6^1 12 blinks

r^{30}_{422} #ts(full) 23

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	2
04	0.382683432	-0.250000000	18
05	0.000000000	0.000000000	34
06	0.707106781	0.250000000	115
07	0.000000000	0.000000000	196
08	0.720437448	-0.462286306	452
09	0.000000000	0.000000000	708
10	0.338511157	0.033860236	1333
11	0.000000000	0.000000000	1958
12	0.866025404	-0.820913276	3254

gem: dabcgefjhimklon
jmledcngkaiobhf
h0 v30 mfhjobacnkdigle

6_4 (0) 4^1 16 blinks

$r^{36}_{?}$ #ts(full) 522

r	mod	theta/pi	#sts
03	1.000000000	-0.250000000	2
04	0.707106781	-0.875000000	18
05	0.525731112	0.850000000	34
06	0.577350269	0.333333333	115
07	0.591009048	-0.678571429	196
08	0.500000000	0.312500000	452
09	0.719004222	-0.661442198	708
10	0.447213595	0.800000000	1333
11	0.638100266	0.282409594	1958
12	1.080123450	-0.518852192	3254

gem: dabcgefjhimklpnorq
jpfedchgomiqalrbnk
h0 v36 onlhpjkqcfgibmarde

6_5 (1) 56 blinks

r^2_1 h1 #ts(full) 1

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	4
04	1.000000000	0.000000000	18
05	1.000000000	0.000000000	64
06	1.000000000	0.000000000	181
07	1.000000000	0.000000000	440
08	1.000000000	0.000000000	964
09	1.000000000	0.000000000	1924
10	1.000000000	0.000000000	3585
11	1.000000000	0.000000000	6304
12	1.000000000	0.000000000	10566

gem: a
a
h1 v2 a

U[1277] edges: 9 blocks: 4 orient: +

U[1294] edges: 9 blocks: 4 orient: +

U[1505] edges: 9 blocks: 4 orient: +

U[1605] edges: 9 blocks: 2 orient: +

U[1702] edges: 9 blocks: 1 orient: +

U[1284] edges: 9 blocks: 4 orient: +

U[1305] edges: 9 blocks: 2 orient: +

U[1536] edges: 9 blocks: 1 orient: +

U[1608] edges: 9 blocks: 2 orient: +

U[1705] edges: 9 blocks: 1 orient: +

U[1781] edges: 9 blocks: 2 orient: +

U[2046] edges: 9 blocks: 1 orient: +

U[2348] edges: 9 blocks: 2 orient: +

U[2662] edges: 9 blocks: 2 orient: +

U[2996] edges: 9 blocks: 1 orient: +

U[2032] edges: 9 blocks: 1 orient: +

U[2174] edges: 9 blocks: 1 orient: +

U[2597] edges: 9 blocks: 7 orient: +

U[2663] edges: 9 blocks: 2 orient: +

U[2997] edges: 9 blocks: 1 orient: +

U[2045] edges: 9 blocks: 1 orient: +

U[2234] edges: 9 blocks: 1 orient: +

U[2614] edges: 9 blocks: 4 orient: +

U[2814] edges: 9 blocks: 1 orient: +

U[3271] edges: 9 blocks: 5 orient: +

U[3278] edges: 9 blocks: 4 orient: +

U[3341] edges: 9 blocks: 4 orient: +

6_6 (0) 2^1 12 blinks

$r_?^{34}$ #ts(full) 6

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	2
04	0.382683432	1.000000000	18
05	0.000000000	0.000000000	34
06	0.912870929	0.602416382	115
07	0.000000000	0.000000000	196
08	0.347248642	-0.310102361	452
09	0.000000000	0.000000000	708
10	0.883480537	-0.587047116	1333
11	0.000000000	0.000000000	1958
12	0.514258871	0.457657593	3254

gem: dabcgefjhimklonqp
joqedclgkaihpmbnf
h0 v34 nfplkiambejoqgdch

U[34] edges: 6 blocks: 1 orient: +

U[376] edges: 8 blocks: 2 orient: +

U[289] edges: 8 blocks: 1 orient: -

U[465] edges: 8 blocks: 1 orient: -

U[310] edges: 8 blocks: 2 orient: +

U[493] edges: 8 blocks: 1 orient: +

U[628] edges: 8 blocks: 1 orient: +

U[2627] edges: 9 blocks: 2 orient: +

U[1850] edges: 9 blocks: 2 orient: -

U[2767] edges: 9 blocks: 2 orient: +

U[2519] edges: 9 blocks: 3 orient: +

U[3222] edges: 9 blocks: 2 orient: +

6_7 (0) 6^1 18 blinks

$r_?^{32}$ #ts(full) 5

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	2
04	0.923879532	0.750000000	18
05	0.000000000	0.000000000	34
06	0.707106781	-0.250000000	115
07	0.000000000	0.000000000	196
08	0.847242829	0.686517318	452
09	0.000000000	0.000000000	708
10	0.776583865	-0.469732718	1333
11	0.000000000	0.000000000	1958
12	0.604190859	0.472956638	3254

gem: dabcgefjhilknmpo
gpindjamkochlefb
h0 v32 kinplchgmajobfed

U[35] edges: 6 blocks: 1 orient: +

U[152] edges: 7 blocks: 2 orient: +

U[370] edges: 8 blocks: 2 orient: -

U[375] edges: 8 blocks: 2 orient: -

U[1044] edges: 9 blocks: 2 orient: -

U[1845] edges: 9 blocks: 2 orient: +

U[2521] edges: 9 blocks: 3 orient: +

U[2634] edges: 9 blocks: 3 orient: +

U[631] edges: 8 blocks: 1 orient: +

U[1077] edges: 9 blocks: 2 orient: +

U[1846] edges: 9 blocks: 2 orient: +

U[2573] edges: 9 blocks: 1 orient: +

U[3008] edges: 9 blocks: 3 orient: +

U[961] edges: 9 blocks: 2 orient: -

U[1777] edges: 9 blocks: 2 orient: +

U[1943] edges: 9 blocks: 1 orient: -

U[2575] edges: 9 blocks: 1 orient: +

U[3219] edges: 9 blocks: 2 orient: +

6_8 (3) 2 blinks

r_1^{24} #ts(full) 1

r	mod	theta/pi	#sts
03	2.000000000	0.000000000	8
04	3.000000000	0.000000000	40
05	4.000000000	0.000000000	152
06	5.000000000	0.000000000	475
07	6.000000000	0.000000000	1280
08	7.000000000	0.000000000	3072
09	8.000000000	0.000000000	6720
10	9.000000000	0.000000000	13629
11	10.000000000	0.000000000	25960
12	11.000000000	0.000000000	46904

gem: cabfdeighljk
ijdclgfkabhe
h0 v24 kegjhalbdifc

U[23] edges: 6 blocks: 1 orient: +

6_9 (0) 2^1 11 blinks

$r_?^{40}$ #ts(full) 936

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	2
04	0.923879533	-0.500000000	18
05	0.000000000	0.000000000	34
06	0.211324865	0.000000000	115
07	0.000000000	0.000000000	196
08	0.631370135	0.868754838	452
09	0.000000000	0.000000000	708
10	0.569259632	0.258655420	1333
11	0.000000000	0.000000000	1958
12	1.106237596	-0.561550362	3254

gem: dabcgefjhimklpnorqts
gqpldkamofjesbrtnihc
h0 v40 kmfotqhgbpanildrcsje

U[39] edges: 6 blocks: 1 orient: +

U[389] edges: 8 blocks: 1 orient: -

U[494] edges: 8 blocks: 1 orient: +

U[1388] edges: 9 blocks: 2 orient: -

U[378] edges: 8 blocks: 2 orient: -

U[436] edges: 8 blocks: 1 orient: -

U[657] edges: 8 blocks: 2 orient: -

U[1402] edges: 9 blocks: 3 orient: +

U[388] edges: 8 blocks: 1 orient: -

U[478] edges: 8 blocks: 1 orient: -

U[1325] edges: 9 blocks: 3 orient: +

6_{10} (0) 4^1 28 blinks

r_{450}^{30} #ts(full) 11

r	mod	theta/pi	#sts
03	1.000000000	-0.250000000	2
04	0.707106781	-0.375000000	18
05	0.811393378	-0.874367653	34
06	0.577350269	0.333333333	115
07	0.319862614	-0.456301736	196
08	0.579470825	-0.768826703	452
09	1.402164704	0.682886658	708
10	1.299053047	0.160087595	1333
11	0.993940357	-0.174214946	1958
12	1.106024861	-0.716482360	3254

gem: dabcgefjhimklon
jmledcognaifbkh
h0 v30 kjglbncaoehdfmi

U[41] edges: 6 blocks: 1 orient: +

U[325] edges: 8 blocks: 1 orient: -

U[477] edges: 8 blocks: 1 orient: -

U[44] edges: 6 blocks: 2 orient: -

U[354] edges: 8 blocks: 1 orient: -

U[576] edges: 8 blocks: 1 orient: -

U[287] edges: 8 blocks: 1 orient: +

U[442] edges: 8 blocks: 1 orient: -

U[874] edges: 9 blocks: 1 orient: -

U[967] edges: 9 blocks: 2 orient: +

U[1383] edges: 9 blocks: 2 orient: +

U[2043] edges: 9 blocks: 1 orient: -

U[2632] edges: 9 blocks: 3 orient: -

U[3013] edges: 9 blocks: 3 orient: +

U[1330] edges: 9 blocks: 3 orient: +

U[1570] edges: 9 blocks: 2 orient: +

U[2543] edges: 9 blocks: 2 orient: -

U[2771] edges: 9 blocks: 2 orient: +

U[3319] edges: 9 blocks: 3 orient: -

U[1363] edges: 9 blocks: 2 orient: -

U[1843] edges: 9 blocks: 2 orient: -

U[2604] edges: 9 blocks: 4 orient: -

U[2991] edges: 9 blocks: 1 orient: +

U[3338] edges: 9 blocks: 4 orient: -

U[3346] edges: 9 blocks: 3 orient: +

U[3414] edges: 9 blocks: 4 orient: -

U[3362] edges: 9 blocks: 3 orient: +

U[3369] edges: 9 blocks: 4 orient: -

6_{11} (0) 2^1 35 blinks

r_{202}^{28} #ts(full) 1

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	2
04	0.923879533	0.500000000	10
05	0.000000000	0.000000000	18
06	0.788675135	1.000000000	45
07	0.000000000	0.000000000	72
08	0.808906139	-0.509007516	136
09	0.000000000	0.000000000	200
10	0.886233714	0.033860236	325
11	0.000000000	0.000000000	450
12	0.885374210	0.598867484	666

gem: dabcgefjhilknm
jlnedchgmaibkf
h0 v28 mfikljaecbnhgd

U[46] edges: 6 blocks: 2 orient: +

U[63] edges: 6 blocks: 3 orient: -

U[72] edges: 7 blocks: 1 orient: +

U[134] edges: 7 blocks: 3 orient: -

U[665] edges: 8 blocks: 2 orient: -

U[957] edges: 8 blocks: 2 orient: +

U[1079] edges: 9 blocks: 2 orient: +

U[1755] edges: 9 blocks: 1 orient: -

U[360] edges: 8 blocks: 2 orient: -

U[800] edges: 9 blocks: 2 orient: -

U[1041] edges: 9 blocks: 2 orient: +

U[1082] edges: 9 blocks: 2 orient: -

U[1853] edges: 9 blocks: 2 orient: -

U[1855] edges: 9 blocks: 2 orient: -

U[2004] edges: 9 blocks: 2 orient: -

U[2326] edges: 9 blocks: 1 orient: +

U[2538] edges: 9 blocks: 4 orient: -

U[2877] edges: 9 blocks: 6 orient: +

U[1933] edges: 9 blocks: 1 orient: +

U[2041] edges: 9 blocks: 1 orient: +

U[2502] edges: 9 blocks: 1 orient: +

U[2539] edges: 9 blocks: 4 orient: -

U[2881] edges: 9 blocks: 6 orient: +

U[1941] edges: 9 blocks: 1 orient: -

U[2073] edges: 9 blocks: 3 orient: +

U[2526] edges: 9 blocks: 3 orient: +

U[2777] edges: 9 blocks: 2 orient: +

U[2899] edges: 9 blocks: 5 orient: -

U[2903] edges: 9 blocks: 5 orient: +

U[3337] edges: 9 blocks: 5 orient: +

6_{12} (0) 2^2 9 blinks

r^{30}_{117} #ts(full) 4

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	1.224744871	0.195913276	16
05	0.000000000	0.000000000	44
06	1.265417925	0.426740081	107
07	0.000000000	0.000000000	224
08	1.249301246	0.677203521	432
09	0.000000000	0.000000000	768
10	1.239329173	0.939446825	1293
11	0.000000000	0.000000000	2068
12	1.257994351	-0.795952264	3184

gem: dabcgefjhimklon
jimednhgkabfolc
h0 v30 nflkhbamodjcegi

U[47] edges: 6 blocks: 1 orient: +
U[303] edges: 8 blocks: 2 orient: +
U[269] edges: 8 blocks: 1 orient: -
U[519] edges: 8 blocks: 1 orient: +
U[291] edges: 8 blocks: 1 orient: -
U[584] edges: 8 blocks: 1 orient: +

U[738] edges: 8 blocks: 3 orient: -

U[757] edges: 8 blocks: 2 orient: +

U[2909] edges: 9 blocks: 3 orient: +

6_{13} (1) 2^1 20 blinks

r^{26}_{11} #ts(full) 2

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	1.000000000	0.625000000	16
05	0.000000000	0.000000000	44
06	1.000000000	-0.500000000	107
07	0.000000000	0.000000000	224
08	1.000000000	0.437500000	432
09	0.000000000	0.000000000	768
10	1.000000000	-0.600000000	1293
11	0.000000000	0.000000000	2068
12	1.000000000	0.375000000	3184

gem: cabfdeighkjml
imdcbkfjalghe
h0 v26 lgkajhbfeimdc

U[48] edges: 6 blocks: 1 orient: +
U[309] edges: 8 blocks: 2 orient: +
U[55] edges: 6 blocks: 2 orient: -
U[411] edges: 8 blocks: 5 orient: +
U[304] edges: 8 blocks: 2 orient: +
U[416] edges: 8 blocks: 2 orient: +

U[421] edges: 8 blocks: 2 orient: +

U[518] edges: 8 blocks: 1 orient: +

U[1279] edges: 9 blocks: 4 orient: -

U[2884] edges: 9 blocks: 4 orient: -

U[3210] edges: 9 blocks: 4 orient: -

U[428] edges: 8 blocks: 4 orient: -

U[618] edges: 8 blocks: 1 orient: -

U[1282] edges: 9 blocks: 4 orient: -

U[2889] edges: 9 blocks: 4 orient: +

U[445] edges: 8 blocks: 3 orient: -

U[619] edges: 8 blocks: 1 orient: -

U[1917] edges: 9 blocks: 2 orient: +

U[2913] edges: 9 blocks: 3 orient: +

6_{14} (0) 5^1 9 blinks

r_1^{16} #ts(full) 1

r	mod	theta/pi	#sts
03	0.707106781	1.000000000	4
04	0.500000000	0.000000000	16
05	0.000000000	0.000000000	44
06	0.288675135	1.000000000	107
07	0.521120889	0.000000000	224
08	0.461939766	1.000000000	432
09	0.303012985	0.000000000	768
10	0.000000000	0.000000000	1293
11	0.230530019	1.000000000	2068
12	0.394337567	0.000000000	3184

gem: cabfdehg
hedcbgfa
h0 v16 gdfbahec

U[1138] edges: 7 blocks: 3 orient: +

U[2514] edges: 9 blocks: 6 orient: +

U[3033] edges: 9 blocks: 4 orient: +

U[723] edges: 8 blocks: 3 orient: +

U[3027] edges: 9 blocks: 3 orient: +

U[3351] edges: 9 blocks: 4 orient: +

6_{15} (0) 2^2 13 blinks

r_{154}^{24} #ts(full) 2

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	1.224744871	0.195913276	16
05	0.000000000	0.000000000	44
06	1.382274793	0.117811240	107
07	0.000000000	0.000000000	224
08	1.460370991	-0.031973990	432
09	0.000000000	0.000000000	768
10	1.477069905	-0.215496875	1293
11	0.000000000	0.000000000	2068
12	1.455875392	-0.420968007	3184

gem: dabchefgjilk
jlfedcbkhaig
h0 v24 khgiajcblfed

U[52] edges: 6 blocks: 3 orient: +

U[348] edges: 8 blocks: 3 orient: -

U[443] edges: 8 blocks: 3 orient: -

U[307] edges: 8 blocks: 2 orient: +

U[418] edges: 8 blocks: 2 orient: -

U[615] edges: 8 blocks: 1 orient: +

U[341] edges: 8 blocks: 3 orient: -

U[422] edges: 8 blocks: 2 orient: +

U[789] edges: 9 blocks: 1 orient: -

U[791] edges: 9 blocks: 1 orient: -

U[2914] edges: 9 blocks: 3 orient: -

U[1274] edges: 9 blocks: 4 orient: +

U[1276] edges: 9 blocks: 4 orient: +

6_{16} (2) 18 blinks

r_{14}^{26} #ts(full) 2

r	mod	theta/pi	#sts
03	1.414213562	0.000000000	4
04	1.000000000	0.000000000	16
05	0.874032049	-0.300000000	44
06	1.732050808	-0.333333333	107
07	2.000000000	-0.242116129	224
08	1.473625758	-0.215694166	432
09	1.414213562	-0.388888889	768
10	2.236067977	-0.400000000	1293
11	2.449489743	-0.315876160	2068
12	1.880398464	-0.293951872	3184

gem: cabfdeighkjml
imdckgfelbhaj
h0 v26 ehgjalmbdifkc

U[54] edges: 6 blocks: 1 orient: +

U[56] edges: 6 blocks: 2 orient: -

U[171] edges: 7 blocks: 2 orient: -

U[203] edges: 8 blocks: 1 orient: -

U[417] edges: 8 blocks: 2 orient: -

U[342] edges: 8 blocks: 3 orient: +

U[794] edges: 9 blocks: 1 orient: +

U[350] edges: 8 blocks: 1 orient: +

U[1288] edges: 9 blocks: 4 orient: -

U[1400] edges: 9 blocks: 1 orient: +

U[1949] edges: 9 blocks: 1 orient: -

U[1998] edges: 9 blocks: 1 orient: +

U[1609] edges: 9 blocks: 2 orient: -

U[1969] edges: 9 blocks: 1 orient: +

U[2000] edges: 9 blocks: 1 orient: -

U[1947] edges: 9 blocks: 1 orient: +

U[1972] edges: 9 blocks: 1 orient: -

U[2231] edges: 9 blocks: 2 orient: -

6_{17} (0) 6^1 4 blinks

$r_?^{36}$ #ts(full) 1

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	2
04	0.923879532	-0.750000000	18
05	0.000000000	0.000000000	34
06	1.581138830	0.102416382	115
07	0.000000000	0.000000000	196
08	1.503987945	0.875000000	452
09	0.000000000	0.000000000	708
10	1.972944708	-0.400000000	1333
11	0.000000000	0.000000000	1958
12	1.877566278	0.308808229	3254

gem: dabcgefjhimklonqpsr
jipodnhgracqfmeksbl
h0 v38 lphrqaisokjfdbgnemc

U[57] edges: 6 blocks: 2 orient: +

U[3167] edges: 9 blocks: 4 orient: +

U[775] edges: 8 blocks: 3 orient: +

U[3152] edges: 9 blocks: 4 orient: +

6_{18} (1) 6 blinks

$r^{32}_{?}$ #ts(full) 4

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	1.000000000	0.000000000	18
05	2.000000000	0.000000000	34
06	2.000000000	0.000000000	115
07	2.000000000	0.000000000	196
08	3.000000000	0.000000000	452
09	3.000000000	0.000000000	708
10	3.000000000	0.000000000	1333
11	4.000000000	0.000000000	1958
12	4.000000000	0.000000000	3254

gem: cabfdeighljknmpo
iodcnjflagepbkmh
h0 v32 kemjhpnbdioclgaf

6_{19} (1) 10 blinks

$r^{40}_{?}$ #ts(full) 2

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	0.000000000	0.000000000	10
05	0.381966011	0.000000000	18
06	1.000000000	0.000000000	45
07	0.198062264	0.000000000	72
08	0.414213562	1.000000000	136
09	0.226681597	1.000000000	200
10	0.236067978	1.000000000	325
11	0.011386646	1.000000000	450
12	0.267949192	0.000000000	666

gem: dabcgefjhimklpnorqts
jnkmdtqgoacpebirhslf
h0 v40 lfsokiapbejgqmrtndch

6_{20} (0) 6^1 19 blinks

r^{24}_{33} #ts(full) 20

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	2
04	0.923879532	-0.750000000	3
05	0.000000000	0.000000000	4
06	0.707106781	0.750000000	5
07	0.000000000	0.000000000	6
08	0.587937801	0.375000000	7
09	0.000000000	0.000000000	8
10	0.563522005	0.000000000	9
11	0.000000000	0.000000000	10
12	0.500000000	-0.375000000	11

gem: dabcgefjhilk
jiledckgbahf
h0 v24 hjgfkdcaelib

7_1 (0) 7^1 3 blinks

$r^{42}_{?}$ #ts(full) 178

r	mod	theta/pi	#sts
03	0.707106781	-0.500000000	2
04	0.500000000	-0.250000000	66
05	0.928333668	0.975632347	130
06	0.288675135	0.000000000	859
07	0.000000000	0.000000000	1588
08	0.191341716	0.625000000	5684
09	1.066553429	-0.002901947	9780
10	0.861803399	-0.951264694	25405
11	0.686394206	0.961668565	41030
12	1.024616848	0.087731235	87686

gem: dabchefgkijnlmqopsrut
hpltduranfckosmbgqiej
h0 v42 nigfodcbhamsujrtleqpk

7_2 (0) 9^1 22 blinks

r_8^{26} #ts(full) 11

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	40
05	0.798872081	-0.254068341	140
06	0.500000000	-0.500000000	515
07	0.327985278	-0.757883871	1376
08	0.732537816	1.000000000	3504
09	0.707106781	0.722222222	7680
10	0.638196601	0.508136683	16005
11	0.927761389	0.348422102	30580
12	0.790569415	0.102416382	56056

gem: cabfdeighkjml
imdcbjfkaglhe
h0 v26 mgkjlcbadifeh

U[1543] edges: 9 blocks: 1 orient: -

U[1957] edges: 9 blocks: 5 orient: +

U[2397] edges: 9 blocks: 1 orient: +

U[3363] edges: 9 blocks: 6 orient: +

U[3435] edges: 9 blocks: 6 orient: -

U[1750] edges: 9 blocks: 1 orient: -

U[2095] edges: 9 blocks: 2 orient: +

U[2430] edges: 9 blocks: 1 orient: +

U[3397] edges: 9 blocks: 5 orient: +

U[1818] edges: 9 blocks: 2 orient: +

U[2100] edges: 9 blocks: 2 orient: -

U[2503] edges: 9 blocks: 1 orient: +

U[3433] edges: 9 blocks: 7 orient: -

7_3 (0) 9^1 13 blinks

$r_?^{32}$ #ts(full) 67

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	40
05	0.371748034	-0.600000000	140
06	0.500000000	0.500000000	515
07	0.689972794	0.201069308	1376
08	1.115221249	0.000000000	3504
09	0.707106781	-0.388888889	7680
10	0.138196601	-0.800000000	16005
11	0.358106204	0.503910557	30580
12	0.790569415	-0.102416382	56056

gem: dabcgefjhilknmpo
gphndialomjckefb
h0 v32 oikfpdmglanbhcje

U[68] edges: 7 blocks: 2 orient: +

U[1464] edges: 9 blocks: 1 orient: -

U[2160] edges: 9 blocks: 1 orient: -

U[843] edges: 9 blocks: 1 orient: +

U[1675] edges: 9 blocks: 2 orient: +

U[2258] edges: 9 blocks: 1 orient: -

U[1335] edges: 9 blocks: 1 orient: +

U[1985] edges: 9 blocks: 1 orient: +

U[2342] edges: 9 blocks: 1 orient: +

U[2542] edges: 9 blocks: 2 orient: -

U[3113] edges: 9 blocks: 1 orient: -

U[2633] edges: 9 blocks: 3 orient: -

U[3072] edges: 9 blocks: 1 orient: +

7_4 (0) 7^1 9 blinks

$r_?^{38}$ #ts(full) 4

r	mod	theta/pi	#sts
03	0.707106781	0.500000000	2
04	0.500000000	-0.750000000	34
05	0.601500955	0.100000000	66
06	0.288675135	0.000000000	309
07	0.314692123	-0.214285714	552
08	0.191341716	-0.125000000	1576
09	0.787310873	0.329402082	2600
10	0.361803399	0.800000000	5725
11	0.570982093	-0.334042779	8850
12	0.198687476	0.377285205	16626

gem: dabcgefjhimklonqpsr
jsmedclgporhfiankqb
h0 v38 igsnhormakjdelpfcbq

U[69] edges: 7 blocks: 1 orient: +

U[994] edges: 9 blocks: 1 orient: +

U[1001] edges: 9 blocks: 1 orient: +

U[1247] edges: 9 blocks: 1 orient: -

U[2115] edges: 9 blocks: 1 orient: -

U[1559] edges: 9 blocks: 1 orient: -

U[2476] edges: 9 blocks: 1 orient: +

U[1661] edges: 9 blocks: 1 orient: +

U[2960] edges: 9 blocks: 1 orient: -

7_5 (0) 3^1 9 blinks

$r_?^{36}$ #ts(full) 7

r	mod	theta/pi	#sts
03	0.707106781	0.500000000	2
04	0.500000000	0.750000000	34
05	0.601500955	-0.500000000	66
06	0.500000000	-0.500000000	309
07	0.754441187	0.009691766	552
08	0.079256334	0.125000000	1576
09	0.447090679	-0.921891136	2600
10	0.361803399	0.000000000	5725
11	0.630267734	-0.900938496	8850
12	0.570930726	-0.712566479	16626

gem: dabcgefjhimklpnorq
jqkmdphgfrcnelbioa
h0 v36 oglpahmfnkjqbredci

U[70] edges: 7 blocks: 1 orient: +

U[502] edges: 8 blocks: 2 orient: +

U[1494] edges: 9 blocks: 2 orient: -

U[2119] edges: 9 blocks: 1 orient: -

U[2734] edges: 9 blocks: 2 orient: -

U[2444] edges: 9 blocks: 1 orient: +

U[3042] edges: 9 blocks: 2 orient: -

7_6 (0) 2^1 25 blinks

r^{30}_{1179} #ts(full) 2

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	2
04	0.382683432	1.000000000	30
05	0.000000000	0.000000000	104
06	0.788675135	1.000000000	367
07	0.000000000	0.000000000	960
08	0.693519923	0.500000000	2440
09	0.000000000	0.000000000	5248
10	0.504018894	0.659776119	10997
11	0.000000000	0.000000000	20712
12	0.872221707	0.269458789	38206

gem: dabcgefjhimklon
jnmedclgoabhfki
h0 v30 lghmanbcfojedik

U[656] edges: 8 blocks: 2 orient: +

U[719] edges: 8 blocks: 2 orient: -

U[759] edges: 8 blocks: 4 orient: +

U[1069] edges: 9 blocks: 2 orient: +

U[1409] edges: 9 blocks: 3 orient: +

U[1748] edges: 9 blocks: 1 orient: -

U[1841] edges: 9 blocks: 2 orient: -

U[814] edges: 9 blocks: 2 orient: +

U[1078] edges: 9 blocks: 2 orient: +

U[1412] edges: 9 blocks: 3 orient: -

U[1773] edges: 9 blocks: 2 orient: -

U[1934] edges: 9 blocks: 1 orient: -

U[907] edges: 9 blocks: 1 orient: -

U[1331] edges: 9 blocks: 3 orient: +

U[1741] edges: 9 blocks: 1 orient: +

U[1775] edges: 9 blocks: 2 orient: -

U[1935] edges: 9 blocks: 1 orient: -

U[1939] edges: 9 blocks: 1 orient: +

U[2327] edges: 9 blocks: 1 orient: +

U[2817] edges: 9 blocks: 1 orient: -

U[1940] edges: 9 blocks: 1 orient: +

U[2572] edges: 9 blocks: 1 orient: -

U[2036] edges: 9 blocks: 1 orient: -

U[2815] edges: 9 blocks: 1 orient: -

7_7 (0) 7^1 7 blinks

$r^{46}_{?}$ #ts(full) 38

r	mod	theta/pi	#sts
03	0.707106781	0.500000000	2
04	0.500000000	0.250000000	34
05	0.928333668	0.624367653	66
06	0.288675135	0.000000000	309
07	1.181577136	0.852483549	552
08	0.349854384	-0.625000000	1576
09	0.647625440	0.998916674	2600
10	0.861803399	-0.248735306	5725
11	0.810567748	0.895827985	8850
12	0.394337567	-0.250000000	16626

gem: dabcgefjhimklpnosqrvtuxw
mofedcrgtwjpauslnhbxqkvi
h0 v48 outjlqaxkpihnmgdvwcsbfre

U[77] edges: 7 blocks: 1 orient: +

U[1760] edges: 9 blocks: 1 orient: +

U[2751] edges: 9 blocks: 1 orient: -

U[1545] edges: 9 blocks: 1 orient: -

U[2554] edges: 9 blocks: 2 orient: -

U[1627] edges: 9 blocks: 1 orient: -

U[2750] edges: 9 blocks: 1 orient: -

7_8 (0) 50 blinks

$r^{34}_{?}$ #ts(full) 250

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	0.000000000	34
05	0.573741760	0.524367653	66
06	0.288675135	0.000000000	309
07	0.562859611	0.131583733	552
08	0.574025149	0.000000000	1576
09	0.560862388	0.614713039	2600
10	0.329179607	0.951264694	5725
11	0.394017849	0.645240884	8850
12	0.460571866	0.130073469	16626

gem: dabcgefjhimklonqp
jipodlqgbacfnmekh
h0 v34 qgnjpkocfmiedhbla

U[78] edges: 7 blocks: 1 orient: +

U[165] edges: 7 blocks: 1 orient: -

U[812] edges: 9 blocks: 2 orient: +

U[1010] edges: 9 blocks: 1 orient: -

U[1165] edges: 9 blocks: 1 orient: +

U[88] edges: 7 blocks: 1 orient: -

U[176] edges: 7 blocks: 1 orient: -

U[925] edges: 9 blocks: 2 orient: -

U[1018] edges: 9 blocks: 1 orient: -

U[1216] edges: 9 blocks: 1 orient: +

U[93] edges: 7 blocks: 1 orient: +

U[749] edges: 8 blocks: 4 orient: +

U[933] edges: 9 blocks: 2 orient: +

U[1096] edges: 9 blocks: 1 orient: +

U[1250] edges: 9 blocks: 1 orient: +

U[1420] edges: 9 blocks: 1 orient: +

U[1509] edges: 9 blocks: 3 orient: -

U[1549] edges: 9 blocks: 1 orient: +

U[1676] edges: 9 blocks: 1 orient: -

U[1817] edges: 9 blocks: 2 orient: -

U[1430] edges: 9 blocks: 1 orient: -

U[1523] edges: 9 blocks: 2 orient: -

U[1560] edges: 9 blocks: 1 orient: +

U[1676] edges: 9 blocks: 2 orient: -

U[1823] edges: 9 blocks: 2 orient: +

U[1984] edges: 9 blocks: 1 orient: -

U[2147] edges: 9 blocks: 1 orient: -

U[2209] edges: 9 blocks: 2 orient: +

U[2341] edges: 9 blocks: 1 orient: -

U[2497] edges: 9 blocks: 1 orient: -

U[2097] edges: 9 blocks: 2 orient: -

U[2148] edges: 9 blocks: 1 orient: +

U[2248] edges: 9 blocks: 1 orient: -

U[2403] edges: 9 blocks: 1 orient: -

U[2755] edges: 9 blocks: 1 orient: -

U[2109] edges: 9 blocks: 1 orient: +

U[2187] edges: 9 blocks: 1 orient: +

U[2249] edges: 9 blocks: 1 orient: +

U[2486] edges: 9 blocks: 1 orient: -

U[2758] edges: 9 blocks: 1 orient: +

U[2802] edges: 9 blocks: 2 orient: -

U[3108] edges: 9 blocks: 1 orient: +

U[3023] edges: 9 blocks: 4 orient: -

U[3125] edges: 9 blocks: 1 orient: +

U[3043] edges: 9 blocks: 2 orient: +

7_9 (1) 3^1 9 blinks

$r_?^{40}$ #ts(full) 1810

r	mod	theta/pi	#sts
03	1.000000000	-0.500000000	4
04	1.000000000	0.250000000	46
05	1.543361918	-0.624367653	152
06	1.000000000	0.333333333	623
07	1.414213562	-0.686455299	1580
08	1.000000000	0.375000000	4308
09	1.532088886	-0.944444444	9084
10	2.127877827	0.110914604	19809
11	1.016298803	0.890999892	36784
12	1.931851652	-0.333333333	69610

gem: dabcgefjhimklpnorqts
jioednlgbartfmcspkqh
h0 v40 loqhbsrmfnjpdktacgie

U[79] edges: 7 blocks: 1 orient: +

U[1232] edges: 9 blocks: 1 orient: -

U[1876] edges: 9 blocks: 2 orient: +

U[2171] edges: 9 blocks: 1 orient: -

U[2929] edges: 9 blocks: 2 orient: +

U[2354] edges: 9 blocks: 2 orient: -

U[2930] edges: 9 blocks: 2 orient: +

U[2404] edges: 9 blocks: 1 orient: +

U[3082] edges: 9 blocks: 2 orient: +

7_{10} (1) 3^1 21 blinks

r_7^{24} #ts(full) 1

r	mod	theta/pi	#sts
03	1.000000000	0.500000000	4
04	0.000000000	0.000000000	46
05	1.000000000	0.700000000	152
06	1.000000000	-0.666666667	623
07	0.000000000	0.000000000	1580
08	1.000000000	-0.375000000	4308
09	1.000000000	0.277777778	9084
10	0.000000000	0.000000000	19809
11	1.000000000	0.590909091	36784
12	1.000000000	-0.750000000	69610

gem: cabfdeighljk
ildckgfjaheb
h0 v24 kegjhalbdifc

U[81] edges: 7 blocks: 1 orient: +

U[87] edges: 7 blocks: 1 orient: -

U[113] edges: 7 blocks: 1 orient: -

U[182] edges: 7 blocks: 2 orient: +

U[1116] edges: 9 blocks: 1 orient: -

U[1238] edges: 9 blocks: 1 orient: -

U[2353] edges: 9 blocks: 2 orient: -

U[2389] edges: 9 blocks: 1 orient: -

U[980] edges: 9 blocks: 1 orient: -

U[1117] edges: 9 blocks: 1 orient: -

U[1875] edges: 9 blocks: 2 orient: -

U[2362] edges: 9 blocks: 2 orient: -

U[2466] edges: 9 blocks: 1 orient: -

U[1063] edges: 9 blocks: 2 orient: +

U[1138] edges: 9 blocks: 3 orient: -

U[1894] edges: 9 blocks: 1 orient: +

U[2388] edges: 9 blocks: 1 orient: -

U[2510] edges: 9 blocks: 5 orient: -

U[2613] edges: 9 blocks: 4 orient: +

U[2708] edges: 9 blocks: 1 orient: +

7_{11} (1) 9 blinks

$r^{40}_{?}$ #ts(full) 115

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	4
04	0.000000000	0.000000000	30
05	0.618033989	0.200000000	96
06	0.000000000	0.000000000	339
07	1.856082398	0.604603779	852
08	1.732050808	0.304086724	2156
09	0.446475588	0.277777778	4548
10	1.328131026	0.254068341	9493
11	0.255700272	-0.136363636	17688
12	2.236067978	0.647583618	32538

gem: dabcgefjhimklpnorqts
jqtedshgmafnrlkbpioc
h0 v40 qfkotlampcjbesdignrh

U[1891] edges: 9 blocks: 2 orient: +

U[1585] edges: 9 blocks: 1 orient: +

U[2393] edges: 9 blocks: 1 orient: +

U[2394] edges: 9 blocks: 1 orient: +

U[3379] edges: 9 blocks: 3 orient: -

U[3385] edges: 9 blocks: 2 orient: +

7_{12} (0) 9^1 29 blinks

r^{24}_{14} #ts(full) 14

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	40
05	0.371748034	0.600000000	140
06	0.500000000	0.500000000	515
07	0.521120889	0.428571429	1376
08	0.191341716	0.000000000	3504
09	0.000000000	0.000000000	7680
10	0.138196601	0.800000000	16005
11	0.422061281	0.363636364	30580
12	0.353553391	0.250000000	56056

gem: cabfdeighljk
ilkcjgfeahdb
h0 v24 lkigbhdfjcea

U[296] edges: 8 blocks: 1 orient: -

U[398] edges: 8 blocks: 1 orient: +

U[610] edges: 8 blocks: 1 orient: -

U[765] edges: 8 blocks: 7 orient: -

U[932] edges: 9 blocks: 2 orient: +

U[1312] edges: 9 blocks: 5 orient: +

U[1566] edges: 9 blocks: 2 orient: -

U[1954] edges: 9 blocks: 5 orient: +

U[797] edges: 9 blocks: 2 orient: -

U[1047] edges: 9 blocks: 2 orient: -

U[1521] edges: 9 blocks: 2 orient: -

U[1568] edges: 9 blocks: 2 orient: +

U[2096] edges: 9 blocks: 2 orient: -

U[823] edges: 9 blocks: 2 orient: -

U[1053] edges: 9 blocks: 2 orient: +

U[1522] edges: 9 blocks: 2 orient: +

U[1746] edges: 9 blocks: 1 orient: -

U[2099] edges: 9 blocks: 2 orient: +

U[2136] edges: 9 blocks: 1 orient: +

U[2728] edges: 9 blocks: 3 orient: +

U[3316] edges: 9 blocks: 2 orient: +

U[2300] edges: 9 blocks: 4 orient: +

U[2739] edges: 9 blocks: 2 orient: +

U[3416] edges: 9 blocks: 8 orient: -

U[2433] edges: 9 blocks: 1 orient: +

U[3051] edges: 9 blocks: 2 orient: +

7_{13} (0) 3^1 37 blinks

$r^{44}_{?}$ #ts(full) 4

r	mod	theta/pi	#sts
03	0.707106781	-0.500000000	2
04	0.500000000	0.250000000	18
05	0.354591908	-0.224367653	42
06	0.500000000	0.500000000	141
07	0.525331292	-0.120518584	294
08	0.303427098	0.375000000	696
09	0.721399981	-0.177468763	1272
10	0.125735421	-0.551264694	2493
11	0.436318646	0.657921191	4150
12	0.668428582	-0.281953411	7186

gem: dabcgefjhimklpnosqrutwv
jruwdkhgmafvslctpbiqone
h0 v46 rfisuplmqojtwekbcvdgnah

U[987] edges: 9 blocks: 1 orient: +

U[1209] edges: 9 blocks: 1 orient: -

U[1265] edges: 9 blocks: 1 orient: +

U[1491] edges: 9 blocks: 2 orient: +

U[156] edges: 7 blocks: 1 orient: +

U[1195] edges: 9 blocks: 1 orient: -

U[1252] edges: 9 blocks: 1 orient: -

U[1418] edges: 9 blocks: 1 orient: -

U[1639] edges: 9 blocks: 1 orient: -

U[831] edges: 9 blocks: 1 orient: -

U[1196] edges: 9 blocks: 1 orient: -

U[1253] edges: 9 blocks: 1 orient: -

U[1433] edges: 9 blocks: 1 orient: -

U[1649] edges: 9 blocks: 1 orient: +

U[1859] edges: 9 blocks: 1 orient: +
U[2158] edges: 9 blocks: 1 orient: +
U[2265] edges: 9 blocks: 1 orient: +
U[2422] edges: 9 blocks: 1 orient: +
U[2492] edges: 9 blocks: 1 orient: +

U[1987] edges: 9 blocks: 1 orient: +
U[2199] edges: 9 blocks: 1 orient: +
U[2270] edges: 9 blocks: 1 orient: +
U[2424] edges: 9 blocks: 1 orient: +
U[2725] edges: 9 blocks: 1 orient: +

U[2737] edges: 9 blocks: 2 orient: -
U[3071] edges: 9 blocks: 1 orient: -
U[3121] edges: 9 blocks: 1 orient: +

U[2966] edges: 9 blocks: 1 orient: -
U[3074] edges: 9 blocks: 1 orient: +

U[3047] edges: 9 blocks: 2 orient: -
U[3115] edges: 9 blocks: 1 orient: +

7_{14} (0) 7^1 32 blinks

r_{10}^{26} #ts(full) 1

r	mod	theta/pi	#sts
03	0.707106781	-0.500000000	2
04	0.500000000	0.750000000	18
05	0.229752921	0.900000000	42
06	0.288675135	0.000000000	141
07	0.707106781	-0.928571429	294
08	0.732537816	0.125000000	696
09	0.618213611	-0.639541727	1272
10	0.052786404	-0.800000000	2493
11	0.493224022	0.457962820	4150
12	0.714957726	-0.345511799	7186

gem: cabfdeighkjml
imdcbkfjalghe
h0 v26 ldfbjhmceiakg

U[94] edges: 7 blocks: 1 orient: +
U[168] edges: 7 blocks: 4 orient: +
U[462] edges: 8 blocks: 2 orient: -
U[751] edges: 8 blocks: 4 orient: +
U[1192] edges: 9 blocks: 3 orient: +

U[158] edges: 7 blocks: 1 orient: +
U[177] edges: 7 blocks: 1 orient: -
U[538] edges: 8 blocks: 1 orient: +
U[991] edges: 9 blocks: 1 orient: +
U[1261] edges: 9 blocks: 1 orient: -

U[166] edges: 7 blocks: 1 orient: -
U[242] edges: 8 blocks: 2 orient: +
U[732] edges: 8 blocks: 5 orient: +
U[1057] edges: 9 blocks: 3 orient: -
U[1314] edges: 9 blocks: 5 orient: +

U[1415] edges: 9 blocks: 1 orient: -
U[1645] edges: 9 blocks: 1 orient: -
U[1955] edges: 9 blocks: 5 orient: +
U[2071] edges: 9 blocks: 3 orient: -
U[2536] edges: 9 blocks: 4 orient: -

U[1512] edges: 9 blocks: 3 orient: -
U[1677] edges: 9 blocks: 2 orient: +
U[2057] edges: 9 blocks: 4 orient: +
U[2312] edges: 9 blocks: 3 orient: -
U[2552] edges: 9 blocks: 2 orient: -

U[1636] edges: 9 blocks: 2 orient: +
U[1715] edges: 9 blocks: 1 orient: -
U[2058] edges: 9 blocks: 4 orient: -
U[2482] edges: 9 blocks: 1 orient: -
U[3053] edges: 9 blocks: 2 orient: -

U[3197] edges: 9 blocks: 2 orient: +

U[3396] edges: 9 blocks: 5 orient: -

7_{15} (0) 21 blinks

$r_{?}^{38}$ #ts(full) 1

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	1.000000000	18
05	0.141995114	-0.600000000	42
06	0.288675135	0.000000000	141
07	0.658686217	-0.602751814	294
08	0.732537816	-0.500000000	696
09	0.254574712	-0.373011580	1272
10	0.020162612	-0.799999999	2493
11	0.642860106	0.824325175	4150
12	0.620303293	-0.930704616	7186

gem: dabcgefjhimklonqpsr
gliedsqorkjbpmfnach
h0 v38 ifokrnhgapqceblsdmj

U[95] edges: 7 blocks: 1 orient: +
U[157] edges: 7 blocks: 1 orient: +

U[118] edges: 7 blocks: 1 orient: +
U[186] edges: 7 blocks: 2 orient: -

U[149] edges: 7 blocks: 1 orient: -
U[402] edges: 8 blocks: 2 orient: -

U[992] edges: 9 blocks: 1 orient: +

U[1644] edges: 9 blocks: 1 orient: +

U[2363] edges: 9 blocks: 1 orient: -

U[2740] edges: 9 blocks: 2 orient: -

U[3102] edges: 9 blocks: 2 orient: +

U[1260] edges: 9 blocks: 1 orient: -

U[1712] edges: 9 blocks: 1 orient: -

U[2485] edges: 9 blocks: 1 orient: -

U[3052] edges: 9 blocks: 2 orient: -

U[3288] edges: 9 blocks: 3 orient: -

7_{16} (0) 3^1 29 blinks

$r_?^{38}$ #ts(full) 20

r	mod	theta/pi	#sts
03	0.707106781	0.500000000	2
04	0.500000000	-0.250000000	18
05	0.493730098	0.845931659	42
06	0.500000000	-0.500000000	141
07	0.447988158	-0.331597963	294
08	0.079256334	0.625000000	696
09	0.188806943	-0.639541727	1272
10	0.243769410	-0.691863317	2493
11	0.660083792	-0.498614108	4150
12	0.664821253	0.372714795	7186

gem: dabcgefjhimklonqpsr
gnledksorqjcbmhifpa
h0 v38 kifnlorgsmapjqcedhb

U[96] edges: 7 blocks: 1 orient: +

U[147] edges: 7 blocks: 1 orient: -

U[175] edges: 7 blocks: 1 orient: -

U[117] edges: 7 blocks: 1 orient: +

U[159] edges: 7 blocks: 1 orient: +

U[239] edges: 8 blocks: 2 orient: -

U[131] edges: 7 blocks: 2 orient: -

U[163] edges: 7 blocks: 1 orient: -

U[993] edges: 9 blocks: 1 orient: +

U[1210] edges: 9 blocks: 1 orient: +

U[1431] edges: 9 blocks: 1 orient: -

U[1557] edges: 9 blocks: 1 orient: +

U[1707] edges: 9 blocks: 1 orient: +

U[2146] edges: 9 blocks: 1 orient: +

U[1246] edges: 9 blocks: 1 orient: +

U[1436] edges: 9 blocks: 1 orient: -

U[1624] edges: 9 blocks: 1 orient: -

U[1717] edges: 9 blocks: 1 orient: -

U[2154] edges: 9 blocks: 1 orient: +

U[1375] edges: 9 blocks: 1 orient: +

U[1531] edges: 9 blocks: 1 orient: +

U[1653] edges: 9 blocks: 1 orient: -

U[1981] edges: 9 blocks: 1 orient: -

U[2247] edges: 9 blocks: 1 orient: +

U[2334] edges: 9 blocks: 1 orient: -

U[2854] edges: 9 blocks: 1 orient: -

U[2337] edges: 9 blocks: 1 orient: -

U[3045] edges: 9 blocks: 2 orient: +

U[2494] edges: 9 blocks: 1 orient: -

7_{17} (0) 2^1 19 blinks

r_{2010}^{30} #ts(full) 3

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	0.923879533	0.500000000	18
05	0.000000000	0.000000000	52
06	0.912870929	0.602416382	141
07	0.000000000	0.000000000	320
08	0.948417712	0.750000000	680
09	0.000000000	0.000000000	1312
10	0.897802733	0.796379978	2405
11	0.000000000	0.000000000	4148
12	0.952607267	0.886224103	6882

gem: dabcgefjhimklon
jomedlhgknbfcai
h0 v30 lfhnibaoekjgdmc

U[98] edges: 7 blocks: 3 orient: +

U[780] edges: 8 blocks: 6 orient: -

U[1066] edges: 9 blocks: 2 orient: +

U[1075] edges: 9 blocks: 2 orient: +

U[1189] edges: 9 blocks: 3 orient: -

U[2540] edges: 9 blocks: 4 orient: -

U[3148] edges: 9 blocks: 4 orient: +

U[3187] edges: 9 blocks: 2 orient: -

U[1125] edges: 9 blocks: 3 orient: -

U[2075] edges: 9 blocks: 3 orient: -

U[3029] edges: 9 blocks: 3 orient: -

U[3165] edges: 9 blocks: 4 orient: +

U[3277] edges: 9 blocks: 4 orient: -

U[1133] edges: 9 blocks: 3 orient: -

U[2524] edges: 9 blocks: 3 orient: -

U[3034] edges: 9 blocks: 4 orient: -

U[3176] edges: 9 blocks: 3 orient: +

U[3335] edges: 9 blocks: 5 orient: +

7_{18} (0) 4^1 33 blinks

r^{30}_{171} #ts(full) 34

r	mod	theta/pi	#sts
03	1.000000000	0.250000000	4
04	0.707106781	-0.875000000	18
05	1.129775731	0.795931659	56
06	0.577350269	0.333333333	153
07	1.295097283	-0.170587450	360
08	1.155762275	-0.397058248	772
09	0.880193088	-0.962426125	1516
10	1.283438193	0.734341190	2797
11	0.693088889	0.314788264	4872
12	1.341879750	-0.183242970	8118

gem: dabcgefjhimklon
jkmedchgnabiolf
h0 v30 feiloadmcnjghkb

7_{19} (0) 7^1 10 blinks

$r^{34}_{?}$ #ts(full) 1

r	mod	theta/pi	#sts
03	0.707106781	0.500000000	2
04	0.500000000	0.250000000	18
05	0.601500955	0.900000000	34
06	0.288675135	0.000000000	115
07	0.314692123	-0.928571429	196
08	0.574025148	0.375000000	452
09	1.020721913	-0.976819061	708
10	0.361803399	-0.800000000	1333
11	0.974417831	-0.609395372	1958
12	0.538030402	-0.011846816	3254

gem: dabcgefjhimklonqp
jmnedchgqaipbflok
h0 v34 pfkonjaelbcihmqgd

7_{20} (1) 3^1 12 blinks

$r^{34}_{?}$ #ts(full) 8

r	mod	theta/pi	#sts
03	1.000000000	0.500000000	4
04	1.000000000	0.750000000	24
05	1.000000000	-0.700000000	76
06	1.000000000	-0.333333333	225
07	1.414213562	0.400741014	536
08	1.000000000	-0.875000000	1184
09	1.331660018	-0.417319505	2344
10	1.618033989	0.200000000	4385
11	1.899806432	0.642499862	7676
12	2.503587265	-0.732958126	12888

gem: dabcgefjhimklonqp
jnlpdkhgfoiqbmaec
h0 v34 kqojnpicgladfehmb

7_{21} (0) 4^1 26 blinks

$r_?^{32}$ #ts(full) 30

r	mod	theta/pi	#sts
03	1.000000000	0.250000000	4
04	0.707106781	-0.125000000	24
05	1.701301617	-0.050000000	76
06	1.154700538	0.000000000	225
07	1.553786730	-0.268654857	536
08	2.040640478	-0.199865932	1184
09	1.362038807	-0.312577170	2344
10	2.271491751	-0.436918733	4385
11	2.099383947	-0.390702659	7676
12	1.795352610	-0.597538068	12888

gem: cabfdeighljknmpo
ipjclnfkadomeghb
h0 v32 ognmhalejidbkpfc

U[2195] edges: 9 blocks: 1 orient: -

U[2242] edges: 9 blocks: 1 orient: -

U[949] edges: 9 blocks: 1 orient: +

U[2210] edges: 9 blocks: 2 orient: -

U[2459] edges: 9 blocks: 1 orient: -

U[1061] edges: 9 blocks: 2 orient: +

U[1064] edges: 9 blocks: 2 orient: +

U[1691] edges: 9 blocks: 2 orient: -

U[2175] edges: 9 blocks: 1 orient: -

U[2465] edges: 9 blocks: 1 orient: -

U[2710] edges: 9 blocks: 1 orient: +

U[1086] edges: 9 blocks: 2 orient: -

U[1914] edges: 9 blocks: 1 orient: +

U[2197] edges: 9 blocks: 1 orient: -

U[2468] edges: 9 blocks: 1 orient: -

U[2711] edges: 9 blocks: 1 orient: +

U[1118] edges: 9 blocks: 1 orient: -

U[2090] edges: 9 blocks: 2 orient: -

U[2464] edges: 9 blocks: 1 orient: -

U[2687] edges: 9 blocks: 1 orient: -

U[2828] edges: 9 blocks: 1 orient: -

U[3083] edges: 9 blocks: 2 orient: +

U[3378] edges: 9 blocks: 3 orient: +

U[3388] edges: 9 blocks: 2 orient: +

U[3361] edges: 9 blocks: 3 orient: +

U[3383] edges: 9 blocks: 3 orient: +

U[3410] edges: 9 blocks: 2 orient: +

U[3368] edges: 9 blocks: 4 orient: -

U[3386] edges: 9 blocks: 2 orient: +

7_{22} (0) 7^1 23 blinks

$r_?^{42}$ #ts(full) 3

r	mod	theta/pi	#sts
03	0.707106781	0.500000000	2
04	0.500000000	0.250000000	10
05	0.659357578	-0.965658810	22
06	0.288675135	0.000000000	55
07	0.252363488	-0.928571429	106
08	0.191341716	0.375000000	208
09	0.386015923	0.209935031	352
10	0.434752416	0.931317619	601
11	0.777229753	-0.884988230	934
12	0.734490785	-0.169842373	1450

gem: dabcgefjhimklpnorqtsvu
jktodnugvarifmespbqchl
h0 v44 rulfsicndtjgoqmbhvekpa

U[114] edges: 7 blocks: 1 orient: +

U[891] edges: 9 blocks: 1 orient: -

U[1026] edges: 9 blocks: 1 orient: -

U[1527] edges: 9 blocks: 1 orient: +

U[1989] edges: 9 blocks: 1 orient: -

U[146] edges: 7 blocks: 1 orient: -

U[953] edges: 9 blocks: 1 orient: -

U[1199] edges: 9 blocks: 1 orient: +

U[1810] edges: 9 blocks: 1 orient: +

U[2153] edges: 9 blocks: 1 orient: +

U[826] edges: 9 blocks: 1 orient: +

U[1022] edges: 9 blocks: 1 orient: -

U[1205] edges: 9 blocks: 1 orient: +

U[1865] edges: 9 blocks: 1 orient: -

U[2163] edges: 9 blocks: 1 orient: -

U[2184] edges: 9 blocks: 1 orient: +

U[2420] edges: 9 blocks: 1 orient: -

U[3099] edges: 9 blocks: 1 orient: +

U[2254] edges: 9 blocks: 1 orient: +

U[2548] edges: 9 blocks: 2 orient: +

U[3112] edges: 9 blocks: 1 orient: -

U[2345] edges: 9 blocks: 1 orient: -

U[3069] edges: 9 blocks: 1 orient: +

7_{23} (0) 3^1 21 blinks

r_2^{28} #ts(full) 1

r	mod	theta/pi	#sts
03	0.707106781	0.500000000	2
04	0.500000000	0.750000000	10
05	0.229752920	-0.300000000	22
06	0.500000000	-0.500000000	55
07	0.736976229	0.543598157	106
08	0.461939766	-0.875000000	208
09	0.767255812	-0.166666667	352
10	0.052786404	-0.400000000	601
11	0.702955105	0.723044161	934
12	0.353553391	-0.500000000	1450

gem: cabfdeighljknm
imdclgfkabnejh
h0 v28 gnejhblcdimakf

7_{24} (0) 3^1 6 blinks

$r_?^{38}$ #ts(full) 269

r	mod	theta/pi	#sts
03	0.707106781	-0.500000000	2
04	0.500000000	0.250000000	18
05	0.229752921	-0.500000000	34
06	0.500000000	0.500000000	115
07	1.170948009	-0.500000000	196
08	0.461939766	0.375000000	452
09	0.408248290	0.833333333	708
10	0.052786405	0.000000000	1333
11	0.508894542	0.897451897	1958
12	0.790569415	-0.147583618	3254

gem: dabcgefjhimklonqpsr
jsmldpnqqabechforik
h0 v38 rghpkibofejaqmcsnld

7_{25} (0) 12 blinks

$r_?^{40}$ #ts(full) 1

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	1.000000000	18
05	0.371748034	0.400000000	34
06	0.288675135	0.000000000	115
07	0.382603047	0.210501073	196
08	0.349854384	0.500000000	452
09	0.324904336	0.456693855	708
10	0.138196601	-0.800000000	1333
11	0.628696668	-0.740508982	1958
12	0.428735677	0.735131180	3254

gem: dabcgefjhimklpnorqts
jtpedoqgsabhnmrclfik
h0 v40 qgslohbtenjdcriapkmf

7_{26} (0) 7^1 10 blinks

$r_?^{34}$ #ts(full) 1

r	mod	theta/pi	#sts
03	0.707106781	-0.500000000	2
04	0.500000000	0.750000000	18
05	0.493730098	0.045931659	34
06	0.288675135	0.000000000	115
07	0.445041868	-0.829312442	196
08	0.349854384	0.125000000	452
09	0.768532521	-0.455129433	708
10	0.243769410	0.908136683	1333
11	0.239060265	0.522358299	1958
12	0.390800930	-0.594866077	3254

gem: dabcgefjhimklonqp
jqlodnhgmafcpkeib
h0 v34 lfqhnpamcojgdekbi

U[1864] edges: 9 blocks: 1 orient: +

U[1992] edges: 9 blocks: 1 orient: -

7_{27} (0) 21 blinks

$r_?^{32}$ #ts(full) 3

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	24
05	0.371748034	-0.800000000	76
06	0.288675135	0.000000000	225
07	0.591009048	-0.043598157	536
08	1.115221249	0.000000000	1184
09	0.367122599	-0.253479442	2344
10	0.138196601	-0.400000000	4385
11	0.300972524	-0.699909199	7676
12	0.809630852	-0.072579519	12888

gem: dabcgefjhilknmpo
jioedclgnaphkbfm
h0 v32 pjlmckoafbiedgnh

U[803] edges: 9 blocks: 2 orient: +

U[934] edges: 9 blocks: 2 orient: +

U[1050] edges: 9 blocks: 2 orient: -

U[1535] edges: 9 blocks: 1 orient: -

U[1754] edges: 9 blocks: 1 orient: +

U[2131] edges: 9 blocks: 1 orient: -

U[2408] edges: 9 blocks: 1 orient: +

U[1467] edges: 9 blocks: 1 orient: -

U[1574] edges: 9 blocks: 2 orient: +

U[1816] edges: 9 blocks: 2 orient: -

U[2133] edges: 9 blocks: 1 orient: +

U[2440] edges: 9 blocks: 1 orient: +

U[1472] edges: 9 blocks: 1 orient: +

U[1742] edges: 9 blocks: 1 orient: +

U[2098] edges: 9 blocks: 2 orient: -

U[2235] edges: 9 blocks: 1 orient: +

U[2441] edges: 9 blocks: 1 orient: +

U[2762] edges: 9 blocks: 1 orient: -

U[2801] edges: 9 blocks: 2 orient: -

U[2871] edges: 9 blocks: 1 orient: +

7_{28} (0) 4^1 25 blinks

$r_?^{36}$ #ts(full) 1

r	mod	theta/pi	#sts
03	1.000000000	0.250000000	4
04	0.707106781	-0.625000000	26
05	1.508772084	-0.384341190	80
06	0.577350269	0.333333333	249
07	1.839930056	0.796784612	580
08	0.463104841	-0.914916382	1320
09	2.078387002	0.099431785	2572
10	1.740453851	0.290344466	4905
11	1.180525788	-0.657529063	8488
12	2.132572276	-0.434086807	14442

gem: dabcgefjhimklpnorq
jomedlhgqpbrcikanf
h0 v36 qiogcnrpbkjafmehld

U[160] edges: 7 blocks: 1 orient: +

U[1087] edges: 9 blocks: 2 orient: +

U[945] edges: 9 blocks: 1 orient: +

U[1113] edges: 9 blocks: 1 orient: -

U[951] edges: 9 blocks: 1 orient: -

U[1120] edges: 9 blocks: 1 orient: +

U[1239] edges: 9 blocks: 1 orient: -

U[1915] edges: 9 blocks: 1 orient: -

U[2390] edges: 9 blocks: 1 orient: +

U[2473] edges: 9 blocks: 1 orient: +

U[2667] edges: 9 blocks: 2 orient: -

U[1881] edges: 9 blocks: 2 orient: +

U[1964] edges: 9 blocks: 1 orient: +

U[2406] edges: 9 blocks: 1 orient: +

U[2648] edges: 9 blocks: 1 orient: -

U[2715] edges: 9 blocks: 1 orient: -

U[1892] edges: 9 blocks: 1 orient: +

U[2352] edges: 9 blocks: 2 orient: -

U[2471] edges: 9 blocks: 1 orient: +

U[2649] edges: 9 blocks: 1 orient: -

U[2716] edges: 9 blocks: 1 orient: -

U[2931] edges: 9 blocks: 2 orient: +

U[3407] edges: 9 blocks: 2 orient: +

U[3137] edges: 9 blocks: 2 orient: +

U[3345] edges: 9 blocks: 3 orient: -

7_{29} (0) 18 blinks

$r_?^{46}$ #ts(full) 2

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	1.000000000	18
05	0.634136124	0.757983330	34
06	0.288675135	0.000000000	115
07	0.851607205	-0.057318500	196
08	0.191341716	0.500000000	452
09	0.854483206	0.777972834	708
10	0.402128624	0.484033340	1333
11	0.642834154	0.352935284	1958
12	0.554460013	-0.642262175	3254

gem: dabcgefjhimklpnosqrvtuxw
jxvudqoglwsinmhfptbrecak
h0 v48 oieplbsqftjxrwudhmgkanvc

U[162] edges: 7 blocks: 1 orient: +

U[174] edges: 7 blocks: 1 orient: +

U[1005] edges: 9 blocks: 1 orient: +

U[1242] edges: 9 blocks: 1 orient: - U[1618] edges: 9 blocks: 1 orient: + U[1713] edges: 9 blocks: 1 orient: - U[2260] edges: 9 blocks: 1 orient: + U[2848] edges: 9 blocks: 1 orient: +

U[1377] edges: 9 blocks: 1 orient: + U[1628] edges: 9 blocks: 1 orient: + U[2123] edges: 9 blocks: 1 orient: - U[2638] edges: 9 blocks: 2 orient: - U[3050] edges: 9 blocks: 2 orient: -

7_{30} (0) 5^1 8 blinks

r^{28}_{203} #ts(full) 1

r	mod	theta/pi	#sts
03	0.707106781	1.000000000	4
04	0.500000000	0.000000000	18
05	0.707106781	0.500000000	52
06	0.288675135	1.000000000	141
07	0.185985892	0.714285714	320
08	0.461939766	0.000000000	680
09	0.806039450	0.522130408	1312
10	0.500000000	1.000000000	2405
11	0.607008531	-0.143812895	4148
12	0.714957726	0.404488201	6882

gem: dabcgefjhilknm
jlnedchgmaibkf
h0 v28 mglhajkncfbied

U[167] edges: 7 blocks: 4 orient: + U[2074] edges: 9 blocks: 3 orient: - U[3201] edges: 9 blocks: 2 orient: -

U[735] edges: 8 blocks: 5 orient: - U[2304] edges: 9 blocks: 3 orient: + U[3399] edges: 9 blocks: 5 orient: +

U[2054] edges: 9 blocks: 4 orient: + U[2309] edges: 9 blocks: 3 orient: +

7_{31} (0) 4^1 9 blinks

$r^{34}_{?}$ #ts(full) 10

r	mod	theta/pi	#sts
03	1.000000000	-0.250000000	4
04	0.707106781	0.625000000	46
05	1.810080993	0.160914604	152
06	0.577350269	-0.333333333	623
07	1.733569223	0.417027963	1580
08	1.778823646	-0.028194166	4308
09	0.852704746	0.684332450	9084
10	2.598612400	0.192398126	19809
11	0.888970886	-0.305045608	36784
12	2.294502752	0.403355052	69610

gem: dabcgefjhimklonqp
jnqedchgkaopbmilf
h0 v34 lqhmkpncbejgdafoi

U[169] edges: 7 blocks: 2 orient: + U[2106] edges: 9 blocks: 1 orient: - U[2592] edges: 9 blocks: 2 orient: -

U[846] edges: 9 blocks: 1 orient: + U[2189] edges: 9 blocks: 1 orient: - U[3309] edges: 9 blocks: 3 orient: +

U[1092] edges: 9 blocks: 2 orient: - U[2387] edges: 9 blocks: 1 orient: + U[3380] edges: 9 blocks: 3 orient: +

7_{32} (0) 7^1 28 blinks

r^{20}_{5} #ts(full) 3

r	mod	theta/pi	#sts
03	0.707106781	-0.500000000	4
04	0.500000000	0.750000000	16
05	0.601500955	0.300000000	44
06	0.288675135	0.000000000	107
07	0.000000000	0.000000000	224
08	0.191341716	-0.875000000	432
09	0.464242827	0.833333333	768
10	0.361803399	0.400000000	1293
11	0.322252701	-0.318181818	2068
12	0.394337567	-0.750000000	3184

gem: cabfdehgji
hjdcbifage
h0 v20 jheicbafdg

U[184] edges: 7 blocks: 6 orient: + U[223] edges: 8 blocks: 1 orient: + U[555] edges: 8 blocks: 3 orient: -

U[194] edges: 7 blocks: 5 orient: + U[320] edges: 8 blocks: 2 orient: - U[595] edges: 8 blocks: 2 orient: +

U[196] edges: 7 blocks: 4 orient: + U[548] edges: 8 blocks: 3 orient: - U[646] edges: 8 blocks: 3 orient: -

U[692] edges: 8 blocks: 5 orient: + U[710] edges: 8 blocks: 3 orient: + U[926] edges: 9 blocks: 2 orient: - U[1484] edges: 9 blocks: 4 orient: - U[1956] edges: 9 blocks: 5 orient: -

U[697] edges: 8 blocks: 5 orient: + U[764] edges: 8 blocks: 7 orient: + U[1045] edges: 9 blocks: 2 orient: - U[1731] edges: 9 blocks: 1 orient: - U[2302] edges: 9 blocks: 4 orient: +

U[704] edges: 8 blocks: 4 orient: + U[801] edges: 9 blocks: 2 orient: - U[1316] edges: 9 blocks: 5 orient: - U[1753] edges: 9 blocks: 1 orient: - U[2437] edges: 9 blocks: 1 orient: +

U[2976] edges: 9 blocks: 1 orient: +

U[3025] edges: 9 blocks: 3 orient: -

7_{33} (0) 4^1 8 blinks

r^{28}_{2418} #ts(full) 18

r	mod	theta/pi	#sts
03	1.000000000	0.250000000	4
04	0.707106781	-0.125000000	16
05	1.376381920	-0.250000000	44
06	0.577350269	-0.333333333	107
07	1.010597060	0.903089436	224
08	1.118033989	0.835083618	432
09	0.582755617	0.179645441	768
10	1.447213596	0.000000000	1293
11	0.550656043	-0.121512295	2068
12	1.080123450	-0.935518859	3184

gem: dabchefgjilknm
jnfedcmihlgakb
h0 v28 gfnlkmadcejhbi

U[910] edges: 9 blocks: 1 orient: +

U[2513] edges: 9 blocks: 5 orient: -

U[2594] edges: 9 blocks: 4 orient: -

U[2896] edges: 9 blocks: 3 orient: +

U[2605] edges: 9 blocks: 4 orient: -

U[2928] edges: 9 blocks: 2 orient: +

U[2893] edges: 9 blocks: 3 orient: -

7_{34} (0) 7^1 5 blinks

$r^{38}_{?}$ #ts(full) 333

r	mod	theta/pi	#sts
03	0.707106781	-0.500000000	2
04	0.500000000	-0.250000000	18
05	1.364479168	0.983429989	34
06	0.288675135	0.000000000	115
07	1.274162392	0.500000000	196
08	1.115221249	-0.375000000	452
09	0.888702314	-0.116447089	708
10	1.861803399	-0.966859979	1333
11	0.472347391	0.103674315	1958
12	1.718877606	0.380073469	3254

gem: dabcgefjhimklonqpsr
jiredpnglasbhmfocqk
h0 v38 ngjmalrskciqoedhfbp

U[193] edges: 7 blocks: 2 orient: +

U[546] edges: 8 blocks: 3 orient: +

U[554] edges: 8 blocks: 3 orient: +

U[3431] edges: 9 blocks: 3 orient: -

7_{35} (0) 5^1 3 blinks

$r^{38}_{?}$ #ts(full) 1

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	0.500000000	18
05	1.144122806	0.100000000	34
06	0.288675135	1.000000000	115
07	1.184516301	0.322487773	196
08	0.079256334	-0.250000000	452
09	1.721691203	0.258309518	708
10	1.309016994	-0.200000000	1333
11	1.039481710	0.146411716	1958
12	1.718877605	-0.369926531	3254

gem: dabcgefjhimklpnosqr
jrqodnmglafshkecpbi
h0 v38 rhosbmpeakjqflcgnid

U[189] edges: 7 blocks: 3 orient: +

U[2287] edges: 9 blocks: 2 orient: +

U[3427] edges: 9 blocks: 4 orient: +

7_{36} (0) 13 blinks

$r^{34}_{?}$ #ts(full) 134

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	0.000000000	18
05	1.066862972	-0.065658810	34
06	0.288675135	0.000000000	115
07	0.430463769	0.318889494	196
08	0.574025149	0.000000000	452
09	0.983926997	0.257976498	708
10	1.138196601	0.131317619	1333
11	0.736368812	-0.095239975	1958
12	1.105662433	0.000000000	3254

gem: dabcgefjhimklonqp
jmoedcqgkaipblfnh
h0 v34 lphmqnbcfojedikga

U[190] edges: 7 blocks: 3 orient: +

U[485] edges: 8 blocks: 1 orient: -

U[876] edges: 9 blocks: 1 orient: +

U[192] edges: 7 blocks: 2 orient: -

U[550] edges: 8 blocks: 3 orient: +

U[1395] edges: 9 blocks: 1 orient: -

U[397] edges: 8 blocks: 1 orient: +

U[556] edges: 8 blocks: 3 orient: +

U[1460] edges: 9 blocks: 1 orient: -

U[2230] edges: 9 blocks: 2 orient: +

U[3424] edges: 9 blocks: 4 orient: +

U[2289] edges: 9 blocks: 2 orient: -

U[2409] edges: 9 blocks: 1 orient: -

7_{37} (0) 3^1 6 blinks

$r^{42}_{?}$ #ts(full) 382

r	mod	theta/pi	#sts
03	0.707106781	-0.500000000	2
04	0.500000000	-0.750000000	18
05	0.862420669	0.530853420	34
06	0.500000000	0.500000000	115
07	0.960840426	-0.473235193	196
08	0.079256334	0.875000000	452
09	1.485270855	0.694619372	708
10	0.743769410	-0.061706841	1333
11	1.667004747	-0.522968707	1958
12	1.369306394	0.647583618	3254

gem: dabcgefjhimklpnosqrut
jtredqognasbumhfpckli
h0 v42 luhmtricgpjodfqkanesb

U[191] edges: 7 blocks: 2 orient: +

U[1393] edges: 9 blocks: 1 orient: +

U[3370] edges: 9 blocks: 3 orient: +

U[3405] edges: 9 blocks: 2 orient: +

U[3429] edges: 9 blocks: 3 orient: -

7_{38} (0) 7^1 5 blinks

r^{28}_{230} #ts(full) 119

r	mod	theta/pi	#sts
03	0.707106781	0.500000000	2
04	0.500000000	-0.250000000	3
05	0.601500955	-0.500000000	4
06	0.288675135	0.000000000	5
07	0.707106781	-0.214285714	6
08	0.191341716	-0.375000000	7
09	0.464242827	0.166666667	8
10	0.361803399	0.000000000	9
11	0.322252701	0.409090909	10
12	0.394337567	0.250000000	11

gem: dabcgefjhilknm
jmfedckgnahbli
h0 v28 mhlgckdbanjeif

U[337] edges: 8 blocks: 4 orient: +

U[698] edges: 8 blocks: 5 orient: -

U[640] edges: 8 blocks: 3 orient: +

8_1 (0) 4^2 1 blinks

$r^{38}_{?}$ #ts(full) 15

r	mod	theta/pi	#sts
03	1.414213562	0.000000000	4
04	1.000000000	0.000000000	136
05	0.743496069	0.000000000	524
06	0.577350269	0.333333333	3227
07	1.379945589	0.201069307	10304
08	1.306562965	0.000000000	35952
09	1.083524966	-0.160953454	94368
10	0.447213595	-0.400000000	247293
11	0.515823949	0.081029626	556468
12	0.869472866	-0.195021719	1223704

gem: dabchefgkijmlonqpsr
hkoedrimlpbgajsnfqc
h0 v38 ljrnmocshbakpqfedgi

U[199] edges: 8 blocks: 1 orient: +

8_2 (0) 2^2 1 blinks

$r^{48}_{?}$ #ts(partial) 441

r	mod	theta/pi	#sts
03	1.414213562	0.000000000	4
04	0.707106781	0.250000000	46
05	2.842648492	0.468146625	160
06	3.214550254	0.383045975	693
07	1.609129118	0.604978243	1916
08	4.847810089	0.777316295	5560
09	5.118135815	0.686782417	12820
10	2.667529461	0.906299286	29725
11	7.014486029	-0.943697500	59960
12	7.139155281	0.968231808	120222

gem: dabcgefjhimklpnosqrvtuxw
jwfedcqgkpihvmualbtsxnro
h0 v48 wtvrnjaesudoxhlqpkcbfigm

U[200] edges: 8 blocks: 1 orient: +

8_3 (1) 4^1 16 blinks

r^{26}_{13} #ts(full) 3

r	mod	theta/pi	#sts
03	1.414213562	0.250000000	4
04	1.000000000	0.625000000	46
05	0.874032049	-0.650000000	160
06	1.732050808	-0.166666667	693
07	2.000000000	0.206401843	1916
08	1.473625758	0.653194166	5560
09	1.414213562	-0.694444444	12820
10	2.236067977	-0.200000000	29725
11	2.449489743	0.202239796	59960
12	1.880398464	0.668951872	120222

gem: cabfdeighkjml
imdcbkfjalghe
h0 v26 lkfjhmaedibgc

U[201] edges: 8 blocks: 1 orient: +

U[763] edges: 8 blocks: 3 orient: +

U[272] edges: 8 blocks: 1 orient: -

U[1394] edges: 9 blocks: 1 orient: -

U[671] edges: 8 blocks: 2 orient: -

U[1398] edges: 9 blocks: 1 orient: +

U[1498] edges: 9 blocks: 2 orient: +

U[1952] edges: 9 blocks: 1 orient: -

U[1977] edges: 9 blocks: 1 orient: -

U[3268] edges: 9 blocks: 2 orient: -

U[1598] edges: 9 blocks: 2 orient: +

U[1968] edges: 9 blocks: 1 orient: +

U[2980] edges: 9 blocks: 2 orient: +

U[1603] edges: 9 blocks: 2 orient: -

U[1976] edges: 9 blocks: 1 orient: -

U[3134] edges: 9 blocks: 3 orient: +

8_4 (0) 2^2 13 blinks

$r^{34}_{?}$ #ts(full) 137

r	mod	theta/pi	#sts
03	1.414213562	0.000000000	4
04	0.707106781	-0.250000000	46
05	1.147483519	-0.875632347	160
06	1.527525232	0.893852193	693
07	0.927682456	0.484232258	1916
08	1.621320344	-0.037653407	5560
09	1.902679944	-0.292134697	12820
10	1.113698893	-0.705763056	29725
11	1.778627975	0.744660628	59960
12	2.119254630	0.463929615	120222

gem: dabcgefjhimklonqp
gnhqdkombfjpciale
h0 v34 iqfnkcpgalojdmehb

U[202] edges: 8 blocks: 1 orient: +

U[531] edges: 8 blocks: 1 orient: +

U[754] edges: 8 blocks: 2 orient: +

U[324] edges: 8 blocks: 1 orient: +

U[589] edges: 8 blocks: 1 orient: -

U[756] edges: 8 blocks: 2 orient: +

U[512] edges: 8 blocks: 1 orient: -

U[736] edges: 8 blocks: 3 orient: +

U[1595] edges: 9 blocks: 2 orient: +

U[2019] edges: 9 blocks: 3 orient: +

U[2026] edges: 9 blocks: 3 orient: +

8_5 (0) 8^1 3 blinks

$r_?^{40}$ #ts(full) 1156

r	mod	theta/pi	#sts
03	1.000000000	-0.250000000	2
04	0.000000000	0.000000000	66
05	0.850650808	-0.150000000	130
06	0.577350269	-0.666666667	859
07	0.327985278	-0.535714286	1588
08	0.707106781	-0.687500000	5684
09	1.250074565	0.785685073	9780
10	0.447213595	0.200000000	25405
11	0.719685563	0.420179170	41030
12	1.000000000	-0.208333333	87686

gem: dabcgefjhimklpnorqts
jtledcogsqpfbmhkairn
h0 v40 fhmtqisbanjprkelocgd

U[278] edges: 8 blocks: 1 orient: +

U[715] edges: 8 blocks: 1 orient: -

8_6 (0) 6^1 1 blinks

$r_?^{46}$ #ts(partial) 812

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	2
04	0.923879532	-0.750000000	66
05	0.000000000	0.000000000	130
06	0.707106781	0.250000000	859
07	0.000000000	0.000000000	1588
08	0.392847479	0.875000000	5684
09	0.000000000	0.000000000	9780
10	0.816458514	-0.377308405	25405
11	0.000000000	0.000000000	41030
12	1.207106781	-0.125000000	87686

gem: dabchefgkijmlpnorqtswuv
hjusdpwkgvatnmcrofelqbi
h0 v46 swphoujdaqlkfvectirgmnb

U[206] edges: 8 blocks: 2 orient: +

8_7 (0) 8^1 25 blinks

r_2^{22} #ts(full) 1

r	mod	theta/pi	#sts
03	1.000000000	0.250000000	4
04	1.000000000	0.625000000	42
05	1.312862063	0.825632347	208
06	1.154700538	1.000000000	877
07	1.198148413	-0.733166650	2744
08	1.414213562	-0.562500000	7876
09	1.250074565	-0.380981594	19540
10	1.283438193	-0.134341190	44937
11	1.372282131	0.028629712	94720
12	1.154700538	0.208333333	188718

gem: cabfdeighkj
ikdcjgfeahb
h0 v22 kdigahbfjce

U[207] edges: 8 blocks: 3 orient: +

U[526] edges: 8 blocks: 1 orient: +

U[781] edges: 8 blocks: 5 orient: -

U[2030] edges: 9 blocks: 1 orient: +

U[3128] edges: 9 blocks: 5 orient: +

U[228] edges: 8 blocks: 2 orient: +

U[534] edges: 8 blocks: 4 orient: +

U[884] edges: 9 blocks: 2 orient: +

U[2659] edges: 9 blocks: 2 orient: -

U[3156] edges: 9 blocks: 4 orient: +

U[300] edges: 8 blocks: 1 orient: -

U[779] edges: 8 blocks: 6 orient: -

U[1080] edges: 9 blocks: 2 orient: -

U[2795] edges: 9 blocks: 2 orient: -

U[3169] edges: 9 blocks: 4 orient: +

U[3177] edges: 9 blocks: 3 orient: -

U[3254] edges: 9 blocks: 2 orient: +

U[3326] edges: 9 blocks: 6 orient: -

U[3343] edges: 9 blocks: 4 orient: -

U[3181] edges: 9 blocks: 2 orient: -

U[3263] edges: 9 blocks: 4 orient: +

U[3330] edges: 9 blocks: 6 orient: -

U[3238] edges: 9 blocks: 3 orient: +

U[3283] edges: 9 blocks: 4 orient: +

U[3336] edges: 9 blocks: 5 orient: -

8_8 (0) 10^1 4 blinks

r_{432}^{30} #ts(full) 105

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	0.382683432	1.000000000	42
05	0.000000000	0.000000000	208
06	0.912870929	-0.397583618	877
07	0.000000000	0.000000000	2744
08	0.720437448	0.412713694	7876
09	0.000000000	0.000000000	19540
10	0.707106781	0.850000000	44937
11	0.000000000	0.000000000	94720
12	0.918860367	-0.423423862	188718

gem: dabcgefjhimklon
jmledcogkainbfh
h0 v30 hlgfodcmenjbaki

U[208] edges: 8 blocks: 3 orient: +

U[623] edges: 8 blocks: 1 orient: +

U[230] edges: 8 blocks: 2 orient: +

U[385] edges: 8 blocks: 2 orient: -

8_{9} (0) 8^{1} 6 blinks

$r_{?}^{34}$ #ts(full) 16

r	mod	theta/pi	#sts
03	1.000000000	-0.250000000	4
04	1.000000000	-0.625000000	42
05	0.850650808	0.650000000	208
06	0.577350269	0.000000000	877
07	0.608767701	-0.568889494	2744
08	0.000000000	0.000000000	7876
09	0.519189758	0.996520558	19540
10	0.690212433	0.475632347	44937
11	0.941974934	-0.257340424	94720
12	0.869472866	0.986688385	188718

gem: dabcgefjhimklonqp
jmpednhgkaifqlcob
h0 v34 pghlqkimbfjocedan

8_{10} (0) 4^{1} 1 blinks

$r_{?}^{44}$ #ts(partial) 728

r	mod	theta/pi	#sts
03	1.000000000	0.250000000	2
04	0.707106781	0.875000000	66
05	0.525731112	-0.450000000	130
06	0.577350269	0.333333333	859
07	1.295097283	0.900841122	1588
08	1.118033989	-0.664916382	5684
09	0.500080549	-0.077620121	9780
10	0.961044639	0.745931659	25405
11	0.354974568	-0.738910223	41030
12	0.894785596	0.051740081	87686

gem: dabcgefjhimklpnorqtsvu
jrkmdpugqacseltvionbhf
h0 v44 fsmloiqtaujrckvgpdbhne

8_{11} (0) 8^{1} 2 blinks

$r_{?}^{42}$ #ts(full) 1820

r	mod	theta/pi	#sts
03	1.000000000	0.250000000	2
04	1.000000000	0.625000000	66
05	1.312862063	-0.925632347	130
06	0.577350269	-0.666666667	859
07	0.835813012	0.007883871	1588
08	1.000000000	0.437500000	5684
09	0.469296676	0.838557802	9780
10	0.961044639	-0.654068341	25405
11	0.838432005	-0.152344612	41030
12	0.869472866	0.346644948	87686

gem: dabcgefjhimklpnosqrut
jutedksglapcrmqfonhib
h0 v42 hprisolndqjgfamtkcube

8_{12} (1) 2^{1} 1 blinks

$r_{?}^{34}$ #ts(full) 17

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	0.765366865	1.000000000	46
05	0.000000000	0.000000000	184
06	1.000000000	0.500000000	789
07	0.000000000	0.000000000	2360
08	1.177656177	-0.357493850	6876
09	0.000000000	0.000000000	16496
10	0.358764504	-0.778685428	38465
11	0.000000000	0.000000000	79336
12	1.298771324	0.613187075	159786

gem: dabcgefjhimklonqp
jpmedcogqabnflhki
h0 v34 lfnhpbamoqjgdceik

8_{13} (0) 2^{2} 2 blinks

$r_{?}^{32}$ #ts(full) 21

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	0.292893219	0.000000000	46
05	0.000000000	0.000000000	184
06	1.265417925	-0.426740081	789
07	0.000000000	0.000000000	2360
08	0.450919691	-0.151899203	6876
09	0.000000000	0.000000000	16496
10	1.449758303	-0.321217097	38465
11	0.000000000	0.000000000	79336
12	0.552816493	-0.065157757	159786

gem: dabcgefjhilknmpo
gomedkanbpjclhif
h0 v32 oneikbpgdlcjafmh

8_{14} (1) 2^{1} 12 blinks

r_{374}^{30} #ts(full) 18

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	1.000000000	0.625000000	46
05	0.000000000	0.000000000	184
06	0.517638090	0.916666667	789
07	0.000000000	0.000000000	2360
08	1.000000000	-0.812500000	6876
09	0.000000000	0.000000000	16496
10	1.000000000	-0.300000000	38465
11	0.000000000	0.000000000	79336
12	0.517638090	-0.041666667	159786

gem: dabcgefjhimklon
jmfedclgnaiobkh
h0 v30 khjlamibgoednfc

8_{15} (0) 38 blinks

$r_?^{32}$ #ts(full) 1

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	54
05	0.798872080	0.345931659	200
06	0.288675135	0.000000000	937
07	0.231920614	-0.571428571	2664
08	0.732537816	1.000000000	8140
09	0.438932487	-0.631428270	18928
10	0.638196601	-0.691863317	45445
11	0.914581925	-0.811004488	91776
12	0.105662433	0.000000000	188546

gem: dabcgefjhilknmpo
jpnedclgmafhokib
h0 v32 mkegcionfbjalpdh

8_{16} (1) 25 blinks

$r_?^{32}$ #ts(full) 35

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	4
04	1.000000000	0.000000000	42
05	0.618033989	-0.400000000	148
06	0.000000000	0.000000000	597
07	0.445041868	-0.857142857	1664
08	0.414213562	1.000000000	4616
09	1.285575219	0.833333333	10720
10	1.175570505	0.500000000	24125
11	1.081281635	0.318181818	48980
12	0.732050808	-0.166666667	96186

gem: cabfdeighljknmpo
ipncmkfoabgeldhj
h0 v32 omgpclebniafhjkd

8_{17} (0) 2^1 2 blinks

$r_?^{36}$ #ts(full) 248

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	0.382683432	1.000000000	42
05	0.000000000	0.000000000	148
06	0.788675135	1.000000000	597
07	0.000000000	0.000000000	1664
08	0.347248642	-0.310102361	4616
09	0.000000000	0.000000000	10720
10	0.764645354	-0.573132575	24125
11	0.000000000	0.000000000	48980
12	0.456891634	0.092220454	96186

gem: dabcgefjhimklpnorq
jlkedcpgqafbnmiroh
h0 v36 ohlpanimgrjcbqedfk

U[224] edges: 8 blocks: 1 orient: -

8_{18} (0) 8^1 22 blinks

r_4^{24} #ts(full) 1

r	mod	theta/pi	#sts
03	1.000000000	-0.250000000	4
04	1.000000000	-0.625000000	42
05	0.324919696	-0.750000000	148
06	0.577350269	-0.666666667	597
07	1.358142324	0.960060936	1664
08	1.414213562	0.562500000	4616
09	1.159792454	0.146322874	10720
10	0.552786405	0.000000000	24125
11	0.847009830	-0.065138837	48980
12	1.527525232	-0.435518859	96186

gem: cabfdeighljk
ildcbkfjahge
h0 v24 kfhaibjlegdc

U[231] edges: 8 blocks: 2 orient: +

U[533] edges: 8 blocks: 4 orient: +

U[650] edges: 8 blocks: 3 orient: -

U[371] edges: 8 blocks: 2 orient: +

U[624] edges: 8 blocks: 1 orient: +

U[688] edges: 8 blocks: 1 orient: -

U[471] edges: 8 blocks: 1 orient: +

U[634] edges: 8 blocks: 1 orient: -

U[886] edges: 9 blocks: 2 orient: +

U[963] edges: 9 blocks: 2 orient: +

U[1698] edges: 9 blocks: 1 orient: +

U[1851] edges: 9 blocks: 2 orient: -

U[2568] edges: 9 blocks: 1 orient: -

U[3131] edges: 9 blocks: 5 orient: +

U[1308] edges: 9 blocks: 2 orient: +

U[1700] edges: 9 blocks: 1 orient: -

U[1937] edges: 9 blocks: 1 orient: -

U[2570] edges: 9 blocks: 1 orient: -

U[1365] edges: 9 blocks: 2 orient: -

U[1782] edges: 9 blocks: 2 orient: -

U[2033] edges: 9 blocks: 1 orient: +

U[2921] edges: 9 blocks: 2 orient: +

8_{19} (1) 1 blinks

$r_?^{52}$ #ts(partial) 697

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	0.000000000	0.000000000	66
05	0.618033989	0.800000000	130
06	0.000000000	0.000000000	859
07	0.198062264	-0.285714286	1588
08	0.414213562	-0.250000000	5684
09	0.446475588	-0.166666667	9780
10	0.381966011	-0.800000000	25405
11	0.701665178	0.454545455	41030
12	0.517638090	0.250000000	87686

gem: dabchefgkijnlmqopsrvtuxwzy
krvedujzhyoqwanflbxspcmtgi
h0 v52 utfnpkbxeocjsdlihqzgayvrwm

U[232] edges: 8 blocks: 1 orient: +

8_{20} (0) 6^1 3 blinks

$r_?^{36}$ #ts(full) 1

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	2
04	0.382683432	0.250000000	66
05	0.000000000	0.000000000	130
06	0.707106781	-0.750000000	859
07	0.000000000	0.000000000	1588
08	0.720437448	-0.537713694	5684
09	0.000000000	0.000000000	9780
10	0.294453494	0.736718154	25405
11	0.000000000	0.000000000	41030
12	0.959448117	-0.936091296	87686

gem: dabcgefjhimklpnorq
jqoednkgmahfrlcbpi
h0 v36 eonhlqmrcpjagibkfd

U[233] edges: 8 blocks: 1 orient: +

U[282] edges: 8 blocks: 1 orient: +

U[490] edges: 8 blocks: 1 orient: -

8_{21} (0) 8^1 3 blinks

$r_?^{34}$ #ts(full) 1

r	mod	theta/pi	#sts
03	1.000000000	0.250000000	2
04	1.000000000	0.625000000	66
05	1.219647006	0.980853420	130
06	0.577350269	-0.666666667	859
07	0.273315148	-0.306814563	1588
08	0.585786438	0.437500000	5684
09	0.354337822	-0.895254940	9780
10	0.798557513	-0.449671663	25405
11	1.118934642	-0.066587861	41030
12	0.409299152	0.314481141	87686

gem: dabchefgkijnlmqop
kqpedcmihlajgonfb
h0 v34 emqfndpkgolhjabic

U[234] edges: 8 blocks: 1 orient: +

U[495] edges: 8 blocks: 1 orient: +

U[568] edges: 8 blocks: 1 orient: -

8_{22} (0) 4^1 1 blinks

$r_?^{54}$ #ts(partial) 325

r	mod	theta/pi	#sts
03	1.000000000	-0.250000000	2
04	0.707106781	-0.875000000	66
05	0.811393378	0.574367653	130
06	1.154700538	0.000000000	859
07	0.563766576	-0.314882978	1588
08	0.736812879	0.903194166	5684
09	0.741960883	-0.083333333	9780
10	0.529764523	-0.739303917	25405
11	0.283096391	-0.521391022	41030
12	0.408248290	-0.625000000	87686

gem: dabchefgkijnlmposqrutwvyxAz
hynodplwbAgktqescmurfzavixj
h0 v54 ugfvAcbthdyswonxpjliareqzkm

8_{23} (0) 2^1 3 blinks

$r_?^{36}$ #ts(full) 20

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	2
04	0.382683432	1.000000000	66
05	0.000000000	0.000000000	130
06	0.912870929	-0.602416382	859
07	0.000000000	0.000000000	1588
08	0.746384854	0.620521590	5684
09	0.000000000	0.000000000	9780
10	0.441732570	0.953380824	25405
11	0.000000000	0.000000000	41030
12	0.747267432	0.238935781	87686

gem: dabcgefjhimklpnorq
jqnkdmhgraecplbfoi
h0 v36 lnrmoaicqkjfdbegph

U[237] edges: 8 blocks: 1 orient: +

U[406] edges: 8 blocks: 1 orient: -

U[479] edges: 8 blocks: 1 orient: +

8_{24} (0) 8^1 1 blinks

$r_?^{40}$ #ts(full) 99

r	mod	theta/pi	#sts
03	1.000000000	-0.250000000	4
04	1.000000000	-0.625000000	42
05	1.051462224	0.850000000	176
06	0.577350269	0.666666667	705
07	0.434258006	0.548930692	2184
08	0.000000000	0.000000000	6124
09	0.506142155	-0.299639732	15028
10	0.170820393	-0.800000000	34213
11	0.321995640	-0.176939824	71688
12	0.370379414	0.007188760	142038

gem: dabcgefjhimklpnorqts
jprtdmlgnaqhfikbosce
h0 v40 nteocbimqsjarldgphkf

U[244] edges: 8 blocks: 1 orient: +

8_{25} (1) 4 blinks

$r_?^{34}$ #ts(full) 4

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	4
04	1.000000000	0.000000000	42
05	0.618033989	-0.400000000	176
06	1.000000000	-0.333333333	705
07	1.246979604	-0.285714286	2184
08	1.000000000	0.000000000	6124
09	0.684040287	-0.055555556	15028
10	0.618033989	-0.200000000	34213
11	1.745895413	-0.233408953	71688
12	1.732050808	-0.166666667	142038

gem: dabcgefjhimklonqp
jioedpmglaqbhkcfn
h0 v34 hgniampedkjcqlbof

U[245] edges: 8 blocks: 1 orient: +

U[2794] edges: 9 blocks: 2 orient: +

U[626] edges: 8 blocks: 1 orient: +

U[2656] edges: 9 blocks: 2 orient: +

8_{26} (0) 24 blinks

r_{19}^{30} #ts(full) 2

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	42
05	0.371748034	0.800000000	176
06	0.288675135	0.000000000	705
07	0.591009048	0.813544701	2184
08	0.732537816	1.000000000	6124
09	0.883936202	-0.464314927	15028
10	0.138196601	0.400000000	34213
11	0.176014538	0.181818182	71688
12	0.105662433	0.000000000	142038

gem: dabcgefihkjmlon
ikmedljgahoncfb
h0 v30 lifjmkbagnchode

U[246] edges: 8 blocks: 1 orient: +

U[601] edges: 8 blocks: 1 orient: +

U[921] edges: 9 blocks: 2 orient: -

U[312] edges: 8 blocks: 2 orient: +

U[816] edges: 9 blocks: 2 orient: -

U[935] edges: 9 blocks: 2 orient: +

U[592] edges: 8 blocks: 1 orient: -

U[904] edges: 9 blocks: 1 orient: -

U[1046] edges: 9 blocks: 2 orient: -

U[1470] edges: 9 blocks: 1 orient: +

U[1747] edges: 9 blocks: 1 orient: +

U[2301] edges: 9 blocks: 4 orient: -

U[2765] edges: 9 blocks: 1 orient: +

U[3344] edges: 9 blocks: 3 orient: -

U[1727] edges: 9 blocks: 1 orient: -

U[1756] edges: 9 blocks: 1 orient: -

U[2442] edges: 9 blocks: 1 orient: -

U[2838] edges: 9 blocks: 1 orient: +

U[3364] edges: 9 blocks: 6 orient: -

U[1730] edges: 9 blocks: 1 orient: +

U[2228] edges: 9 blocks: 1 orient: -

U[2443] edges: 9 blocks: 1 orient: -

U[3287] edges: 9 blocks: 3 orient: +

U[3411] edges: 9 blocks: 5 orient: +

8_{27} (0) 2^2 3 blinks

$r_?^{42}$ #ts(full) 225

r	mod	theta/pi	#sts
03	1.414213562	0.000000000	4
04	0.707106781	-0.250000000	46
05	0.919011682	-0.400000000	160
06	1.527525232	-0.227185526	693
07	1.876944533	-0.163482085	1916
08	1.588105141	-0.392202871	5560
09	2.646471160	-0.734352349	12820
10	2.446470572	-0.847440600	29725
11	0.589178870	-0.771221636	59960
12	0.070175303	0.701144573	120222

gem: dabcgefjhimklpnosqrut
jtledkogsupcqmhfnbira
h0 v42 pihruldsbojnefkatgcqm

U[308] edges: 8 blocks: 1 orient: +

U[614] edges: 8 blocks: 1 orient: +

U[614] edges: 8 blocks: 1 orient: +

8_{28} (0) 2^2 5 blinks

$r_?^{38}$ #ts(full) 99

r	mod	theta/pi	#sts
03	1.414213562	0.000000000	4
04	0.707106781	0.250000000	46
05	1.442445995	0.436918733	160
06	0.577350269	0.333333333	693
07	1.420169000	-0.913688449	1916
08	1.738412477	0.935499849	5560
09	0.688044230	-0.680374022	12820
10	1.945145788	-0.632920077	29725
11	0.617609192	-0.674588652	59960
12	2.127357637	-0.107319938	120222

gem: dabcgefjhimklonqpsr
jmsedcogkainqrhlbpf
h0 v38 kgqsnjbrcpodemafihl

U[271] edges: 8 blocks: 1 orient: +

U[1597] edges: 9 blocks: 2 orient: -

U[510] edges: 8 blocks: 1 orient: +

U[1945] edges: 9 blocks: 1 orient: -

U[752] edges: 8 blocks: 2 orient: +

8_{29} (0) 2^1 1 blinks

$r_?^{56}$ #ts(partial) 632

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	2
04	0.923879533	-0.500000000	34
05	0.000000000	0.000000000	70
06	0.211324865	0.000000000	319
07	0.000000000	0.000000000	658
08	0.630104364	-0.565927296	1816
09	0.000000000	0.000000000	3496
10	0.859688175	0.367140087	7561
11	0.000000000	0.000000000	13414
12	1.790446602	-0.691803573	25114

gem: dabchefgkijnlmqopsrutwvzxyBA
kytldqsAhraecznjfpBwxumvboig
h0 v56 wlqzotvpnebksujhxAmriyBcgdfa

U[273] edges: 8 blocks: 1 orient: +

8_{30} (0) 4^1 4 blinks

$r_?^{40}$ #ts(full) 1

r	mod	theta/pi	#sts
03	1.000000000	-0.250000000	2
04	0.707106781	-0.375000000	34
05	0.649839392	0.650000000	70
06	1.154700538	0.000000000	319
07	1.245203479	-0.164010994	658
08	1.386208092	-0.554960881	1816
09	0.691179293	-0.844821626	3496
10	0.406888371	0.200000000	7561
11	1.497208381	-0.462067879	13414
12	2.020832229	-0.878264689	25114

gem: dabchefgkijmlonrpqts
ktqedcpihnsrjmgofbal
h0 v40 rgljtmbqeockfsdnhapi

U[274] edges: 8 blocks: 1 orient: +

U[574] edges: 8 blocks: 1 orient: +

U[453] edges: 8 blocks: 1 orient: -

U[475] edges: 8 blocks: 1 orient: -

8_{31} (1) 1 blinks

$r_?^{34}$ #ts(full) 9

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	8
04	1.000000000	0.000000000	76
05	1.902113033	0.100000000	416
06	2.000000000	0.000000000	1875
07	1.949855824	-0.071428571	6760
08	2.414213562	0.000000000	21160
09	2.645751311	-0.106147807	58248
10	2.618033989	-0.200000000	145685
11	2.490705848	-0.151859806	334928
12	2.828427125	-0.250000000	719652

gem: dabcgefjhimklonqp
jqoedchgnlpaimfkb
h0 v34 eoipndlmcbjgqakfh

U[275] edges: 8 blocks: 1 orient: +

8_{32} (1) 2^2 4 blinks

r_6^{24} #ts(full) 1

r	mod	theta/pi	#sts
03	2.000000000	0.000000000	8
04	3.000000000	0.000000000	76
05	4.000000000	0.000000000	416
06	5.000000000	0.000000000	1875
07	6.000000000	0.000000000	6760
08	7.000000000	0.000000000	21160
09	8.000000000	0.000000000	58248
10	9.000000000	0.000000000	145685
11	10.000000000	0.000000000	334928
12	11.000000000	0.000000000	719652

gem: cabfdeighljk
ildckgfjaheb
h0 v24 jifbhkaldgce

U[276] edges: 8 blocks: 1 orient: +

U[572] edges: 8 blocks: 1 orient: +

U[521] edges: 8 blocks: 1 orient: +

U[536] edges: 8 blocks: 2 orient: +

8_{33} (0) 4^1 1 blinks

$r_?^{46}$ #ts(full) 21

r	mod	theta/pi	#sts
03	1.000000000	-0.250000000	2
04	0.707106781	-0.375000000	66
05	1.129775731	-0.804068341	130
06	0.577350269	0.333333333	859
07	0.371971784	0.992116129	1588
08	0.579470825	-0.768826703	5684
09	0.869777237	0.605421575	9780
10	1.014484897	0.116570011	25405
11	0.957460540	-0.265514771	41030
12	1.005965272	-0.791666667	87686

gem: dabcgefjhimklpnosqrutwv
mvnedchgpujtwfbsolirkqa
h0 v46 vftjlbwueopismrkgdnchaq

U[277] edges: 8 blocks: 1 orient: +

8_{34} (0) 6^1 1 blinks

$r_?^{36}$ #ts(full) 1

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	2
04	0.382683432	-0.250000000	66
05	0.000000000	0.000000000	130
06	0.707106781	0.750000000	859
07	0.000000000	0.000000000	1588
08	0.429037164	-0.270801826	5684
09	0.000000000	0.000000000	9780
10	0.717662549	0.916366497	25405
11	0.000000000	0.000000000	41030
12	0.401315257	-0.440713527	87686

gem: dabcgefjhimklpnorq
jqpedcmglroihbkfna
h0 v36 qoegckipdfjbnmlrah

8_{35} (0) 2^1 2 blinks

$r_?^{48}$ #ts(full) 12

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	2
04	0.382683432	1.000000000	34
05	0.000000000	0.000000000	82
06	0.211324865	0.000000000	379
07	0.000000000	0.000000000	838
08	1.506029053	0.500000000	2428
09	0.000000000	0.000000000	4732
10	0.530552656	-0.081235500	10741
11	0.000000000	0.000000000	18994
12	0.530406280	0.560961991	36910

gem: dabcgefjhimklpnosqrutwvyx
mtfedcrgqojwyukiphbsxnlva
h0 v50 ufoxiqvnltrehmysbkpdwgajc

U[280] edges: 8 blocks: 1 orient: +

U[505] edges: 8 blocks: 1 orient: +

8_{36} (0) 2^1 6 blinks

$r_?^{46}$ #ts(full) 27

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	2
04	0.923879533	-0.500000000	34
05	0.000000000	0.000000000	82
06	0.788675135	1.000000000	379
07	0.000000000	0.000000000	838
08	0.488168261	0.250000000	2428
09	0.000000000	0.000000000	4732
10	0.409515514	-0.935212016	10741
11	0.000000000	0.000000000	18994
12	1.062689028	-0.495343205	36910

gem: dabcgefjhimklpnosqrutwv
jrqudwhgkasfnmvcpbioetl
h0 v46 sftlrowupqjdchbekivmnag

U[284] edges: 8 blocks: 1 orient: +

U[663] edges: 8 blocks: 1 orient: +

U[440] edges: 8 blocks: 1 orient: +

U[1382] edges: 9 blocks: 2 orient: +

U[506] edges: 8 blocks: 1 orient: +

U[2626] edges: 9 blocks: 2 orient: +

8_{37} (0) 8^1 6 blinks

$r_?^{42}$ #ts(full) 28

r	mod	theta/pi	#sts
03	1.000000000	0.250000000	2
04	0.000000000	0.000000000	34
05	0.501468686	0.225632347	82
06	0.577350269	0.666666667	379
07	0.500992186	0.931960968	838
08	0.507305936	0.883413276	2428
09	0.509633993	-0.565075331	4732
10	0.453743728	0.254068341	10741
11	0.325082529	-0.474049198	18994
12	0.641515964	0.090522094	36910

gem: dabcgefjhimklpnosqrut
joledcrgqasunmbiphtkf
h0 v42 lgsrapuqonjedkiftmchb

U[285] edges: 8 blocks: 1 orient: +

U[662] edges: 8 blocks: 1 orient: +

U[438] edges: 8 blocks: 1 orient: +

U[718] edges: 8 blocks: 2 orient: -

U[507] edges: 8 blocks: 1 orient: +

U[1767] edges: 9 blocks: 2 orient: -

8_{38} (0) 4^1 19 blinks

$r_?^{38}$ #ts(full) 517

r	mod	theta/pi	#sts
03	1.000000000	-0.250000000	2
04	0.707106781	-0.875000000	34
05	0.200811416	0.250000000	82
06	0.577350269	-0.333333333	379
07	0.193262994	-0.451069307	838
08	0.358719468	-0.991586724	2428
09	0.538781472	0.825196270	4732
10	0.331406180	0.836918733	10741
11	0.347083972	0.158838426	18994
12	0.261897795	-0.507188760	36910

gem: dabcgefjhimklonqpsr
grnqdkjfoahpcmslebi
h0 v38 nqfrmchgbojdspkaile

U[286] edges: 8 blocks: 1 orient: +

U[508] edges: 8 blocks: 1 orient: +

U[679] edges: 8 blocks: 2 orient: -

U[467] edges: 8 blocks: 1 orient: -

U[629] edges: 8 blocks: 1 orient: -

U[685] edges: 8 blocks: 1 orient: -

U[468] edges: 8 blocks: 1 orient: +

U[658] edges: 8 blocks: 2 orient: -

U[969] edges: 9 blocks: 2 orient: -

U[1309] edges: 9 blocks: 2 orient: -

U[1774] edges: 9 blocks: 2 orient: +

U[1847] edges: 9 blocks: 2 orient: +

U[2811] edges: 9 blocks: 1 orient: -

U[1323] edges: 9 blocks: 3 orient: +

U[1779] edges: 9 blocks: 2 orient: +

U[2562] edges: 9 blocks: 1 orient: -

U[1364] edges: 9 blocks: 2 orient: +

U[1842] edges: 9 blocks: 2 orient: +

U[2629] edges: 9 blocks: 2 orient: -

8_{39} (0) 2 blinks

$r_?^{44}$ #ts(full) 215

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	42
05	1.152900519	0.139303917	160
06	0.288675135	0.000000000	637
07	0.472164002	-0.074495310	1904
08	0.956708581	0.000000000	5284
09	0.971563868	-0.205398566	12772
10	1.329179607	-0.278607834	28881
11	0.898697857	-0.282573153	60016
12	0.974159496	-0.225562748	118422

gem: dabcgefjhimklpnorqtsvu
jpumdshgqacoeitvnfrlkb
h0 v44 vghraktpsfjenmucodibql

U[607] edges: 8 blocks: 1 orient: +

8_{40} (0) 19 blinks

$r_?^{32}$ #ts(full) 1

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	42
05	0.973248989	-0.200000000	160
06	0.288675135	0.000000000	637
07	0.335134997	0.428571429	1904
08	0.191341716	1.000000000	5284
09	0.820097109	0.437010460	12772
10	0.947213595	0.400000000	28881
11	0.681606923	0.554088586	60016
12	0.785383335	0.219672871	118422

gem: dabcgefjhilknmpo
jpnedclgkamhofib
h0 v32 mkegcionfbjalpdh

U[294] edges: 8 blocks: 1 orient: +

U[609] edges: 8 blocks: 1 orient: +

U[1218] edges: 9 blocks: 2 orient: -

U[1587] edges: 9 blocks: 1 orient: +

U[2137] edges: 9 blocks: 1 orient: +

U[336] edges: 8 blocks: 1 orient: +

U[676] edges: 8 blocks: 2 orient: -

U[1427] edges: 9 blocks: 1 orient: +

U[2094] edges: 9 blocks: 2 orient: +

U[2238] edges: 9 blocks: 1 orient: +

U[450] edges: 8 blocks: 1 orient: -

U[878] edges: 9 blocks: 1 orient: -

U[1459] edges: 9 blocks: 1 orient: +

U[2127] edges: 9 blocks: 1 orient: +

U[2240] edges: 9 blocks: 1 orient: -

U[2428] edges: 9 blocks: 1 orient: +

U[2870] edges: 9 blocks: 1 orient: -

U[2436] edges: 9 blocks: 1 orient: -

U[2869] edges: 9 blocks: 1 orient: +

8_{41} (1) 2 blinks

$r_?^{42}$ #ts(full) 2

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	4
04	1.000000000	0.000000000	42
05	0.381966011	0.600000000	160
06	1.000000000	0.333333333	637
07	1.722945460	0.292780556	1904
08	1.585786438	0.000000000	5284
09	0.941054183	-0.205097284	12772
10	0.449027977	0.500000000	28881
11	1.499327363	0.115739455	60016
12	1.701435345	-0.191757030	118422

gem: cabfdeighljkomnrpqtsvu
iurclsfkoqhtjvabmdgepn
h0 v44 qlmkhpaeviuntbfogsrcdj

U[297] edges: 8 blocks: 1 orient: +

U[524] edges: 8 blocks: 1 orient: +

8_{42} (0) 2^1 11 blinks

$r_?^{32}$ #ts(full) 2

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	0.382683432	1.000000000	42
05	0.000000000	0.000000000	160
06	0.912870929	0.602416382	637
07	0.000000000	0.000000000	1904
08	0.693519923	-0.500000000	5284
09	0.000000000	0.000000000	12772
10	0.624668955	-0.800000000	28881
11	0.000000000	0.000000000	60016
12	0.851311470	0.090626782	118422

gem: dabcgefjhilknmpo
jmpedchgoniblakf
h0 v32 onikljaecmphfbgd

U[299] edges: 8 blocks: 1 orient: +

U[591] edges: 8 blocks: 1 orient: -

U[1076] edges: 9 blocks: 2 orient: +

U[380] edges: 8 blocks: 2 orient: -

U[903] edges: 9 blocks: 1 orient: +

U[1752] edges: 9 blocks: 1 orient: +

U[527] edges: 8 blocks: 1 orient: +

U[1068] edges: 9 blocks: 2 orient: +

U[1928] edges: 9 blocks: 1 orient: +

U[2321] edges: 9 blocks: 1 orient: +

U[2839] edges: 9 blocks: 1 orient: -

8_{43} (1) 2^1 6 blinks

$r_?^{32}$ #ts(full) 5

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	0.765366865	1.000000000	26
05	0.000000000	0.000000000	96
06	0.517638090	0.916666667	315
07	0.000000000	0.000000000	856
08	1.177656177	0.357493850	2096
09	0.000000000	0.000000000	4612
10	0.755761506	-0.216366497	9449
11	0.000000000	0.000000000	18072
12	0.607428767	-0.216947358	32834

gem: dabcgefjhilknmpo
gplndiabomjckefh
h0 v32 ikempbhglnfadojc

U[301] edges: 8 blocks: 2 orient: +

U[532] edges: 8 blocks: 1 orient: -

U[399] edges: 8 blocks: 1 orient: +

U[585] edges: 8 blocks: 1 orient: +

U[514] edges: 8 blocks: 1 orient: +

U[745] edges: 8 blocks: 1 orient: -

8_{44} (0) 2^2 2 blinks

$r_?^{32}$ #ts(full) 35

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	0.707106781	1.000000000	26
05	0.000000000	0.000000000	96
06	0.869472866	0.138311615	315
07	0.000000000	0.000000000	856
08	0.816728020	-0.607493850	2096
09	0.000000000	0.000000000	4612
10	0.788480632	0.581357994	9449
11	0.000000000	0.000000000	18072
12	0.853558602	-0.167778956	32834

gem: dabcgefjhilknmpo
gknpdhlfobjaicme
h0 v32 molikbngdcejphfa

U[302] edges: 8 blocks: 2 orient: +

U[429] edges: 8 blocks: 4 orient: -

8_{45} (0) 4^1 8 blinks

$r_?^{40}$ #ts(full) 5

r	mod	theta/pi	#sts
03	1.000000000	0.250000000	2
04	0.707106781	0.375000000	34
05	1.129775731	0.695931659	66
06	0.577350269	1.000000000	309
07	0.145967181	-0.464285714	552
08	0.866025404	-0.366586724	1576
09	0.894975849	-0.009664320	2600
10	0.690212433	0.275632347	5725
11	1.140852671	0.303566773	8850
12	0.715518084	0.576144573	16626

gem: dabcgefjhimklpnorqts
jonldktgsarecmbipfqh
h0 v40 tqipnmreckjbfhgdlsoa

U[311] edges: 8 blocks: 2 orient: +

U[1300] edges: 9 blocks: 2 orient: +

U[2934] edges: 9 blocks: 3 orient: +

U[870] edges: 9 blocks: 1 orient: +

U[2037] edges: 9 blocks: 1 orient: +

U[2990] edges: 9 blocks: 1 orient: -

U[956] edges: 9 blocks: 2 orient: +

U[2816] edges: 9 blocks: 1 orient: -

8_{46} (0) 2^2 1 blinks

$r_?^{38}$ #ts(full) 15

r	mod	theta/pi	#sts
03	1.414213562	0.000000000	4
04	1.581138830	-0.102416382	40
05	1.147483519	0.075632347	140
06	1.527525232	0.227185526	515
07	2.599308479	0.142857143	1376
08	2.309932128	0.064087655	3504
09	1.304070861	-0.060302465	7680
10	1.065247584	0.248735306	16005
11	1.632672224	0.269859261	30580
12	2.000801418	0.009009635	56056

gem: dabcgefjhimklonqpsr
jpsedrognqfbimhlakc
h0 v38 pflihbqmrojneckasdg

U[322] edges: 8 blocks: 1 orient: +

8_{47} (1) 4^1 1 blinks

$r_?^{36}$ #ts(full) 9

r	mod	theta/pi	#sts
03	1.414213562	0.250000000	4
04	1.414213562	0.375000000	40
05	1.662507751	0.650000000	140
06	1.000000000	1.000000000	515
07	0.784829317	-0.892857143	1376
08	1.082392200	-0.562500000	3504
09	0.967379051	-0.416666667	7680
10	1.940085571	-0.236918733	16005
11	2.186657504	0.068181818	30580
12	2.129764866	0.263311615	56056

gem: dabcgefjhimklpnorq
jlredchgqmonabkipf
h0 v36 ekioadrpcbjgqmfhnl

U[323] edges: 8 blocks: 1 orient: +

8_{48} (0) 4^2 2 blinks

$r_?^{40}$ #ts(full) 585

r	mod	theta/pi	#sts
03	1.414213562	0.000000000	4
04	1.000000000	0.000000000	16
05	0.283990228	-0.600000000	68
06	1.154700538	-0.666666667	203
07	1.105688214	-0.641403620	548
08	0.627214702	-0.668673297	1328
09	0.335872902	0.979149892	2904
10	0.244919042	0.569146580	5893
11	0.734440119	0.392502451	11268
12	0.740758829	0.451144573	20368

gem: dabcgefjhimklpnorqts
jioqdrpgsafcnmltekbh
h0 v40 legnbtiocsjaqrhmpdkf

U[333] edges: 8 blocks: 1 orient: +

U[448] edges: 8 blocks: 1 orient: -

8_{49} (0) 2^2 15 blinks

r_3^{28} #ts(full) 2

r	mod	theta/pi	#sts
03	1.414213562	0.000000000	4
04	1.581138830	-0.102416382	16
05	2.559841090	-0.089085396	68
06	2.886751346	0.000000000	203
07	3.084893077	0.009243036	548
08	4.041755366	0.067012518	1328
09	4.321944958	0.163304705	2904
10	4.525084883	0.202697812	5893
11	5.466396440	0.273432297	11268
12	5.721473335	0.370261945	20368

gem: cabfdeighljknm
imdclgfkabnejh
h0 v28 hnjgkalfcimdeb

U[335] edges: 8 blocks: 1 orient: +

U[677] edges: 8 blocks: 2 orient: +

U[753] edges: 8 blocks: 2 orient: -

U[1221] edges: 9 blocks: 2 orient: +

U[2022] edges: 9 blocks: 3 orient: -

U[340] edges: 8 blocks: 3 orient: +

U[721] edges: 8 blocks: 2 orient: -

U[761] edges: 8 blocks: 3 orient: +

U[1604] edges: 9 blocks: 2 orient: +

U[2028] edges: 9 blocks: 3 orient: -

U[449] edges: 8 blocks: 1 orient: -

U[739] edges: 8 blocks: 3 orient: -

U[788] edges: 9 blocks: 1 orient: +

U[1946] edges: 9 blocks: 1 orient: -

U[2796] edges: 9 blocks: 2 orient: -

8_{50} (0) 4^1 13 blinks

$r_?^{42}$ #ts(full) 1

r	mod	theta/pi	#sts
03	1.000000000	-0.250000000	2
04	0.707106781	-0.875000000	18
05	0.896803907	0.892016670	42
06	0.577350269	0.333333333	141
07	1.002941495	-0.154251425	294
08	0.746734119	-0.374667042	696
09	0.139225461	0.766735806	1272
10	0.340166764	0.718878161	2493
11	0.334841057	0.326882972	4150
12	0.399531115	-0.759713256	7186

gem: dabcgefjhimklpnorqtsvu
jvoqdthgfmipascuenrklb
h0 v44 prgkbjlesfdcumtaohvqni

U[683] edges: 8 blocks: 1 orient: -

U[1302] edges: 9 blocks: 2 orient: +

U[686] edges: 8 blocks: 1 orient: +

U[958] edges: 9 blocks: 2 orient: +

U[489] edges: 8 blocks: 1 orient: -

U[613] edges: 8 blocks: 1 orient: -

U[496] edges: 8 blocks: 1 orient: -

U[682] edges: 8 blocks: 1 orient: +

U[580] edges: 8 blocks: 1 orient: +

U[871] edges: 9 blocks: 1 orient: +

8_{51} (1) 18 blinks

$r_?^{32}$ #ts(full) 8

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	1.000000000	0.000000000	18
05	1.175570505	0.300000000	42
06	1.000000000	0.333333333	141
07	0.867767478	0.357142857	294
08	0.414213562	1.000000000	696
09	0.347296355	-0.777777778	1272
10	0.381966011	-0.600000000	2493
11	1.219287869	-0.204617593	4150
12	1.239313675	-0.132188760	7186

gem: dabcgefjhilknmpo
gplndiobfmjckeah
h0 v32 ikempblganfhdojc

U[372] edges: 8 blocks: 2 orient: +

U[390] edges: 8 blocks: 1 orient: +

U[481] edges: 8 blocks: 1 orient: +

U[965] edges: 9 blocks: 2 orient: +

U[1496] edges: 9 blocks: 2 orient: -

U[2283] edges: 9 blocks: 1 orient: -

U[1366] edges: 9 blocks: 2 orient: -

U[1696] edges: 9 blocks: 1 orient: -

U[2284] edges: 9 blocks: 1 orient: +

U[1391] edges: 9 blocks: 2 orient: +

U[2035] edges: 9 blocks: 1 orient: +

U[2987] edges: 9 blocks: 1 orient: -

8_{52} (0) 2^1 14 blinks

$r_?^{40}$ #ts(full) 134

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	2
04	0.923879533	0.500000000	18
05	0.000000000	0.000000000	42
06	0.211324865	0.000000000	141
07	0.000000000	0.000000000	294
08	0.622972205	0.750000000	696
09	0.000000000	0.000000000	1272
10	0.764645354	-0.173132575	2493
11	0.000000000	0.000000000	4150
12	1.248858970	0.554447219	7186

gem: dabcgefjhimklpnorqts
jmledotgraipbqfcsknh
h0 v40 fqjkpadbnsgtimhroecl

U[377] edges: 8 blocks: 2 orient: +

U[664] edges: 8 blocks: 1 orient: -

U[1385] edges: 9 blocks: 2 orient: +

U[439] edges: 8 blocks: 1 orient: -

U[678] edges: 8 blocks: 2 orient: +

U[1404] edges: 9 blocks: 3 orient: -

U[659] edges: 8 blocks: 2 orient: +

U[767] edges: 8 blocks: 3 orient: -

U[1786] edges: 9 blocks: 2 orient: -

U[1926] edges: 9 blocks: 1 orient: +

U[2566] edges: 9 blocks: 1 orient: -

U[1930] edges: 9 blocks: 1 orient: -

U[3010] edges: 9 blocks: 3 orient: -

U[1931] edges: 9 blocks: 1 orient: -

8_{53} (0) 4^1 3 blinks

$r_?^{50}$ #ts(full) 26

r	mod	theta/pi	#sts
03	1.000000000	0.250000000	2
04	0.707106781	0.375000000	18
05	1.154175590	0.929867984	42
06	0.577350269	-0.333333333	141
07	0.672660685	-0.059771029	294
08	1.007958969	0.531348404	696
09	0.495417003	-0.866665652	1272
10	0.565320085	-0.405097937	2493
11	0.709291966	0.130344221	4150
12	0.277512574	0.300676301	7186

gem: eabcdifghljkomnrpqustwvyx
iytwfemlagrujdvoskqcxpnhb
h0 v50 kuvxroyctismleqdfnajwhbpg

U[387] edges: 8 blocks: 1 orient: +

U[579] edges: 8 blocks: 1 orient: +

U[680] edges: 8 blocks: 1 orient: +

8_{54} (1) 9 blinks

$r_?^{46}$ #ts(full) 1

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	0.000000000	0.000000000	18
05	0.953850122	-0.475632347	42
06	1.000000000	-0.333333333	141
07	0.542197364	-0.092192716	294
08	0.717438935	-0.554086724	696
09	1.466970071	-0.540756552	1272
10	0.886125419	-0.630853420	2493
11	0.846451309	0.863834192	4150
12	1.196152423	1.000000000	7186

gem: dabcgefjhimklpnosqrutwv
mpsudthgfwjnalvboicreqk
h0 v46 qvfmnktpsecirjgwadlobuh

8_{55} (0) 6^1 4 blinks

$r_?^{44}$ #ts(full) 6

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	2
04	0.923879532	0.750000000	34
05	0.000000000	0.000000000	66
06	1.366025404	-0.500000000	309
07	0.000000000	0.000000000	552
08	1.437941165	0.573838436	1576
09	0.000000000	0.000000000	2600
10	1.030662717	-0.632269000	5725
11	0.000000000	0.000000000	8850
12	1.220711039	0.381045243	16626

gem: dabcgefjhimklpnosqrutwv
mrfedchgbujwplsavioqktn
h0 v46 skitojrecmbafduwpvlnhgq

8_{56} (0) 8^1 3 blinks

$r_?^{48}$ #ts(full) 1740

r	mod	theta/pi	#sts
03	1.000000000	0.250000000	2
04	0.000000000	0.000000000	34
05	1.051462224	-0.450000000	66
06	0.577350269	0.000000000	309
07	0.895976316	0.946232452	552
08	1.292893219	-0.812500000	1576
09	0.741153355	-0.342792490	2600
10	0.890568150	0.481121839	5725
11	0.636099066	-0.991636297	8850
12	1.000000000	-0.458333333	16626

gem: dabcgefjhimklpnosqrvtuxw
jxmvduhgfobnslwqptcrieak
h0 v48 trkilwvmdcjqufsaxbophgne

8_{57} (0) 9^1 1 blinks

$r_?^{40}$ #ts(full) 4

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	40
05	0.573741760	0.075632347	140
06	0.500000000	-0.500000000	515
07	0.407556913	-0.634873164	1376
08	0.349854384	1.000000000	3504
09	0.461531173	-0.277777778	7680
10	0.329179607	-0.151264694	16005
11	0.266468731	0.245208563	30580
12	0.570930726	-0.037433521	56056

gem: dabcgefjhimklpnorqts
jsmedcrgotbpfkiqlhna
h0 v40 rgthqlbpckjsnmedoafi

8_{58} (1) 1 blinks

$r_?^{60}$ #ts(full) 1

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	0.000000000	0.000000000	18
05	1.763932023	0.000000000	36
06	2.000000000	0.000000000	119
07	0.166603321	0.000000000	232
08	0.343145751	0.000000000	522
09	1.483604329	0.000000000	942
10	0.819660113	0.000000000	1761
11	0.685715605	1.000000000	2932
12	0.287187079	0.000000000	4904

gem: fabcdelghijkomnqpsrutwvzxyBADC
onyDhBfAdtzmlkaucqwsCxjvrbegpi
h0 v60 xDjApyznwcCaqheotvdmruBlfgsikb

8_{59} (0) 9^1 1 blinks

$r_?^{36}$ #ts(full) 1115

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	40
05	0.973248989	0.000000000	140
06	0.500000000	-0.500000000	515
07	0.327985278	0.757883871	1376
08	0.191341716	0.000000000	3504
09	0.707106781	0.388888889	7680
10	0.947213596	0.000000000	16005
11	0.484450781	-0.526968265	30580
12	0.353553391	-0.250000000	56056

gem: dabcgefjhimklpnorq
jqmedclgpanhfkbroi
h0 v36 hpgqidrmeojnalkbfc

8_{60} (0) 3 blinks

$r_?^{34}$ #ts(full) 1

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	40
05	1.066862972	0.065658810	140
06	0.288675135	0.000000000	515
07	0.508215158	0.222269693	1376
08	1.115221249	0.000000000	3504
09	0.885306649	0.079853891	7680
10	1.138196601	-0.131317619	16005
11	1.216808218	-0.359125860	30580
12	0.785383335	-0.219672871	56056

gem: dabcgefjhimklonqp
jlpedchgqoibnmafk
h0 v34 mgiopnjfcbdeqhkla

U[412] edges: 8 blocks: 2 orient: +

U[484] edges: 12 blocks: 1 orient: +

U[1217] edges: 9 blocks: 2 orient: +

8_{61} (1) 2^1 3 blinks

$r_?^{40}$ #ts(full) 654

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	1.000000000	-0.625000000	30
05	0.000000000	0.000000000	96
06	1.505971179	0.195021719	339
07	0.000000000	0.000000000	852
08	2.192173247	-0.721634796	2156
09	0.000000000	0.000000000	4548
10	1.799227753	0.194067532	9493
11	0.000000000	0.000000000	17688
12	2.784816679	-0.904416858	32538

gem: dabcgefjhimklpnorqts
jmnedprgtaisbclfohqk
h0 v40 hotrnlbpdsjfemgacikq

U[414] edges: 8 blocks: 2 orient: +

U[588] edges: 8 blocks: 1 orient: -

U[758] edges: 8 blocks: 2 orient: -

8_{62} (2) 1 blinks

$r_?^{42}$ #ts(full) 1669

r	mod	theta/pi	#sts
03	1.414213562	0.000000000	4
04	1.000000000	0.000000000	30
05	1.878260910	0.045931659	96
06	2.645751311	-0.060518859	339
07	1.671002411	-0.166028250	852
08	1.424583185	-0.086570345	2156
09	2.256828219	-0.187516775	4548
10	1.199038824	-0.363081267	9493
11	0.610994605	0.362153920	17688
12	1.044526044	0.040940332	32538

gem: dabcgefjhimklpnosqrut
jqkmdsngpacbehfultori
h0 v42 tfiokbasrejgnmuqpchld

U[415] edges: 8 blocks: 2 orient: +

8_{63} (1) 4^1 5 blinks

$r_?^{36}$ #ts(full) 9

r	mod	theta/pi	#sts
03	1.414213562	-0.250000000	4
04	1.414213562	-0.875000000	46
05	1.662507751	0.550000000	152
06	1.000000000	0.000000000	623
07	0.784829317	-0.821428571	1580
08	1.082392200	0.562500000	4308
09	0.967379051	-0.250000000	9084
10	1.940085571	0.963081267	19809
11	2.186657504	0.295454545	36784
12	2.129764866	-0.486688385	69610

gem: dabcgefjhimklpnorq
jpkedchgmnforaqbli
h0 v36 lqencbopakjidmgrfh

U[419] edges: 8 blocks: 2 orient: +

U[616] edges: 8 blocks: 1 orient: +

U[517] edges: 8 blocks: 1 orient: -

U[617] edges: 8 blocks: 1 orient: +

U[530] edges: 8 blocks: 1 orient: +

8_{64} (1) 2^1 1 blinks

$r_?^{42}$ #ts(partial) 926

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	1.847759065	-0.500000000	46
05	0.000000000	0.000000000	152
06	1.931851653	0.583333333	623
07	0.000000000	0.000000000	1580
08	2.254416155	-0.335946779	4308
09	0.000000000	0.000000000	9084
10	3.245114573	0.605321992	19809
11	0.000000000	0.000000000	36784
12	3.564102561	-0.539275974	69610

gem: dabcgefjhimklpnosqrut
musedchgrkjiplqatnfob
h0 v42 rqohiltsmucfejkbpadgn

U[420] edges: 8 blocks: 2 orient: +

8_{65} (0) 4^2 1 blinks

$r_?^{30}$ #ts(full) 2

r	mod	theta/pi	#sts
03	1.414213562	0.000000000	4
04	2.000000000	0.000000000	40
05	2.133725944	-0.065658810	140
06	2.081665999	-0.077210479	515
07	1.765886819	-0.099258986	1376
08	1.530733729	0.000000000	3504
09	1.690244090	0.090326760	7680
10	2.393295645	0.148305285	16005
11	3.018115199	0.121735628	30580
12	3.565744127	0.090482485	56056

gem: dabcgefjhimklon
jnledkhgfoicbma
h0 v30 nlejhbicgkdfoam

U[433] edges: 8 blocks: 1 orient: +

8_{66} (0) 4^1 2 blinks

$r_?^{44}$ #ts(full) 359

r	mod	theta/pi	#sts
03	1.000000000	0.250000000	2
04	0.707106781	0.375000000	18
05	0.431535930	0.604068341	42
06	0.577350269	0.333333333	141
07	1.114980971	0.905240558	294
08	0.853923135	-0.484520870	696
09	0.068580052	-0.592037244	1272
10	0.598050814	-0.040937664	2493
11	0.496082285	0.063540854	4150
12	0.991317595	0.626260928	7186

gem: dabcgefjhimklpnorqtsvu
ghmtdsubvkjnrlifpcqeao
h0 v44 qoeijtkgdcvfnmsraublph

U[435] edges: 8 blocks: 1 orient: +

U[661] edges: 8 blocks: 1 orient: +

8_{67} (0) 2^1 1 blinks

$r_?^{46}$ #ts(partial) 612

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	2
04	0.382683432	1.000000000	34
05	0.000000000	0.000000000	66
06	0.211324865	0.000000000	309
07	0.000000000	0.000000000	552
08	0.702872741	-0.551985329	1576
09	0.000000000	0.000000000	2600
10	1.099636886	0.153941395	5725
11	0.000000000	0.000000000	8850
12	0.283145881	0.228377070	16626

gem: dabcgefjhimklpnosqrutwv
jqnkdmvgtrepwcbuoaislhf
h0 v46 trlwivcpekjgqmsdnbuaofh

8_{68} (0) 6^1 3 blinks

$r_?^{42}$ #ts(full) 2

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	2
04	0.923879532	0.750000000	34
05	0.000000000	0.000000000	66
06	0.707106781	-0.250000000	309
07	0.000000000	0.000000000	552
08	0.672001218	0.785923135	1576
09	0.000000000	0.000000000	2600
10	0.203486757	0.371314572	5725
11	0.000000000	0.000000000	8850
12	0.812148454	0.494615443	16626

gem: dabcgefjhimklpnosqrut
jupmdlhgracsebtkoifqn
h0 v42 rgusaolpctjbnmfqhedki

U[447] edges: 8 blocks: 1 orient: +

U[452] edges: 8 blocks: 1 orient: -

U[654] edges: 8 blocks: 2 orient: +

8_{69} (0) 2^1 1 blinks

$r_?^{52}$ #ts(partial) 886

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	2
04	0.923879533	-0.500000000	34
05	0.000000000	0.000000000	66
06	0.912870929	0.602416382	309
07	0.000000000	0.000000000	552
08	0.595614732	-0.198838436	1576
09	0.000000000	0.000000000	2600
10	0.593806412	0.621372934	5725
11	0.000000000	0.000000000	8850
12	1.118046701	-0.525205540	16626

gem: dabchefgkijnlmporqtsvuxwzy
kjoedqvlhpaiyrnbtcxfszmuwg
h0 v52 lxjsnzmkqtwurydipgocahvbef

U[451] edges: 8 blocks: 1 orient: +

8_{70} (1) 3 blinks

$r_?^{48}$ #ts(full) 1

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	0.000000000	0.000000000	18
05	0.236067978	1.000000000	42
06	0.000000000	0.000000000	141
07	0.039228661	0.000000000	294
08	0.171572875	0.000000000	696
09	0.704088191	0.000000000	1272
10	0.090169944	1.000000000	2493
11	0.402278222	1.000000000	4150
12	0.660254038	1.000000000	7186

gem: dabcgefjhimklpnosqrutwvyx
jsvedcmglnxihakqpwurbytof
h0 v50 xrgnbtopfwjsdmchveyiqukal

U[464] edges: 8 blocks: 1 orient: +

U[627] edges: 8 blocks: 1 orient: +

U[684] edges: 8 blocks: 1 orient: +

8_{71} (0) 8^1 2 blinks

$r_?^{50}$ #ts(full) 2

r	mod	theta/pi	#sts
03	1.000000000	0.250000000	2
04	0.000000000	0.000000000	18
05	0.737066422	-0.566570011	42
06	0.577350269	0.000000000	141
07	0.393671798	0.789335673	294
08	1.207629678	0.946867463	696
09	0.757225811	-0.603465608	1272
10	0.412374395	0.271104148	2493
11	1.455611136	0.636873176	4150
12	1.067623520	-0.926169526	7186

gem: dabchefgkijnlmqopsrvtuxwzy
krxedcvphmzquonigwysjlbfta
h0 v52 qhitaljbcgfkpwvyeoxdnruzms

U[473] edges: 8 blocks: 1 orient: +

U[611] edges: 8 blocks: 1 orient: -

8_{72} (0) 9^1 9 blinks

$r_?^{36}$ #ts(full) 129

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	40
05	0.573741760	0.075632347	140
06	0.500000000	0.500000000	515
07	0.608767701	0.351798064	1376
08	0.574025149	0.000000000	3504
09	0.621819268	0.166666667	7680
10	0.329179607	-0.151264694	16005
11	0.113185398	0.043326988	30580
12	0.713424555	0.207606999	56056

gem: dabcgefjhimklpnorq
jqoedckgmahnrlfbpi
h0 v36 oghmaqbcfrjpdkelin

U[482] edges: 8 blocks: 1 orient: +

U[1724] edges: 9 blocks: 1 orient: -

U[1230] edges: 9 blocks: 2 orient: +

U[1762] edges: 9 blocks: 1 orient: -

U[1629] edges: 9 blocks: 1 orient: -

U[2553] edges: 9 blocks: 2 orient: +

U[2752] edges: 9 blocks: 1 orient: +

U[2849] edges: 9 blocks: 1 orient: -

U[2985] edges: 9 blocks: 1 orient: -

8_{73} (0) 2^1 2 blinks

$r_?^{50}$ #ts(full) 5

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	2
04	0.923879533	0.500000000	34
05	0.000000000	0.000000000	66
06	0.788675135	1.000000000	309
07	0.000000000	0.000000000	552
08	0.689593520	-0.499639452	1576
09	0.000000000	0.000000000	2600
10	0.284048923	0.318119411	5725
11	0.000000000	0.000000000	8850
12	0.907653268	0.564899156	16626

gem: dabchefgkijmlpnorqustxvwzy
kpmqdrsihwnovazbetxfcuygjl
h0 v52 wfyluzvjroxksmhqpincegadtb

U[486] edges: 8 blocks: 1 orient: +

U[491] edges: 8 blocks: 1 orient: +

8_{74} (1) 2^1 1 blinks

$r_?^{44}$ #ts(full) 554

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	1.847759065	-0.500000000	38
05	0.000000000	0.000000000	120
06	1.414213562	0.750000000	467
07	0.000000000	0.000000000	1156
08	0.352259679	-0.750000000	3084
09	0.000000000	0.000000000	6420
10	2.387512269	0.228262401	13845
11	0.000000000	0.000000000	25520
12	3.905716420	-0.615953415	47986

gem: dabcgefjhimklpnorqtsvu
jiovdskgpahqtmcblfrune
h0 v44 rmujihtcenqsbdgkpavofl

8_{75} (0) 2^2 4 blinks

$r_?^{36}$ #ts(full) 1

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	1.707106781	0.000000000	38
05	0.000000000	0.000000000	120
06	2.154700538	0.000000000	467
07	0.000000000	0.000000000	1156
08	2.474741603	0.000000000	3084
09	0.000000000	0.000000000	6420
10	2.731292639	0.000000000	13845
11	0.000000000	0.000000000	25520
12	2.954689261	0.000000000	47986

gem: dabchefgkijnlmporq
hqjedpnrfolkbgcima
h0 v36 jgflombihaqrcenkpd

U[515] edges: 8 blocks: 1 orient: +

U[720] edges: 8 blocks: 2 orient: +

U[516] edges: 8 blocks: 1 orient: +

U[620] edges: 8 blocks: 1 orient: +

8_{76} (1) 2^2 1 blinks

U[520] edges: 8 blocks: 1 orient: +

$r_?^{34}$ #ts(full) 1

r	mod	theta/pi	#sts
03	2.000000000	0.000000000	8
04	2.000000000	0.000000000	58
05	0.763932023	0.000000000	280
06	1.000000000	1.000000000	1069
07	2.097834679	1.000000000	3408
08	1.656854249	1.000000000	9416
09	0.241229517	0.000000000	23344
10	2.527864045	0.000000000	52805
11	3.769080595	0.000000000	111096
12	3.071796770	0.000000000	219466

gem: cabfdeighljkomnqp
igdclnfmpbhokgeaj
h0 v34 nfjmqblpciegdahok

8_{77} (2) 1 blinks

U[529] edges: 8 blocks: 1 orient: +

$r_?^{46}$ #ts(partial) 591

r	mod	theta/pi	#sts
03	1.414213562	0.000000000	4
04	0.000000000	0.000000000	46
05	1.027486297	0.600000000	152
06	2.000000000	0.166666667	623
07	2.156588475	0.007983979	1580
08	1.171572875	0.375000000	4308
09	2.402325114	0.463131819	9084
10	1.685510709	0.269146580	19809
11	1.397456305	0.093750731	36784
12	2.204894836	0.195021719	69610

gem: dabcgefjhimklpnosqrutwv
jnurdmwglaqovbikpetscfh
h0 v46 quhptakmbgjsclvdfoweirn

8_{78} (1) 2^2 1 blinks

$r_?^{32}$ #ts(full) 6

r	mod	theta/pi	#sts
03	2.000000000	0.000000000	8
04	2.236067978	-0.147583618	118
05	1.236067977	-0.400000000	680
06	1.000000000	0.666666667	3427
07	2.828427125	0.329312442	12752
08	3.367958692	0.067330496	41724
09	2.000000000	-0.222222222	116880
10	1.000000000	0.800000000	298725
11	3.464101615	0.411396568	693880
12	4.251093597	0.136526731	1509026

gem: cabfdeighljknmpo
ipdconfmkeahlgjb
h0 v32 ekhgaplonimdbjcf

U[535] edges: 8 blocks: 2 orient: +

8_{79} (0) 3 blinks

$r_?^{44}$ #ts(full) 335

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	1.000000000	46
05	0.141995114	0.600000000	152
06	0.288675135	0.000000000	623
07	0.082771509	-0.714285714	1580
08	0.574025149	-0.500000000	4308
09	0.524074563	-0.426125823	9084
10	0.020162612	0.799999999	19809
11	0.692378365	0.903564168	36784
12	0.292810637	-0.946439045	69610

gem: dabcgefjhimklpnorqtsvu
jmvedcngraioshuqpkbltf
h0 v44 rfljtoakesvcnmbudgqiph

U[537] edges: 8 blocks: 1 orient: +

U[3290] edges: 9 blocks: 3 orient: -

U[3333] edges: 9 blocks: 4 orient: +

8_{80} (0) 8^1 1 blinks

U[542] edges: 8 blocks: 3 orient: +

$r_?^{40}$ #ts(full) 1

r	mod	theta/pi	#sts
03	1.000000000	-0.750000000	4
04	1.000000000	-0.375000000	48
05	1.051462224	0.150000000	172
06	1.527525232	0.560518859	765
07	0.962058338	-0.797257751	2148
08	0.000000000	0.000000000	6400
09	0.398298707	0.368284509	14788
10	1.014484897	0.883429989	34965
11	2.100445468	-0.805745480	70420
12	2.516611478	-0.328259864	143280

gem: dabcgefjhimklonrpqts
jomedspglabnrikhftqc
h0 v40 nliqtrcogkjbamsedfhp

8_{81} (0) 10^1 1 blinks

$r_?^{42}$ #ts(full) 42

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	0.923879533	1.000000000	48
05	0.000000000	0.000000000	172
06	1.788675135	0.000000000	765
07	0.000000000	0.000000000	2148
08	1.075001423	1.000000000	6400
09	0.000000000	0.000000000	14788
10	0.000000000	0.000000000	34965
11	0.000000000	0.000000000	70420
12	0.918743919	0.000000000	143280

gem: dabcgefjhimklpnosqrut
mupsdrhgfqjnatkcoielb
h0 v42 fnlhioqrtspcbmaugdjek

U[546] edges: 8 blocks: 3 orient: +

8_{82} (0) 8^1 1 blinks

$r_?^{46}$ #ts(full) 538

r	mod	theta/pi	#sts
03	1.000000000	-0.250000000	2
04	0.000000000	0.000000000	66
05	0.324919696	0.450000000	130
06	0.577350269	0.000000000	859
07	1.246040212	-0.017059428	1588
08	2.121320344	-0.687500000	5684
09	1.126746646	0.563947537	9780
10	0.690212433	-0.075632347	25405
11	1.020378823	-0.891211030	41030
12	0.000000000	0.000000000	87686

gem: dabcgefjhimklpnosqrutwv
jvmedohgtasnplucbwkrfqi
h0 v46 twnmakrcsfjeuhbqpvildgo

U[551] edges: 8 blocks: 2 orient: +

8_{83} (0) 2^1 1 blinks

$r_?^{38}$ #ts(full) 4

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	2
04	0.382683432	1.000000000	66
05	0.000000000	0.000000000	130
06	0.912870929	0.602416382	859
07	0.000000000	0.000000000	1588
08	0.528130334	1.000000000	5684
09	0.000000000	0.000000000	9780
10	0.617831101	0.766727020	25405
11	0.000000000	0.000000000	41030
12	0.498161380	0.773658293	87686

gem: dabcgefjhimklonqpsr
jisednhgqaorfmclbpk
h0 v38 iorkqlbpadjsehgnmcf

U[552] edges: 8 blocks: 2 orient: +

8_{84} (0) 4^1 2 blinks

$r_?^{44}$ #ts(full) 1

r	mod	theta/pi	#sts
03	1.000000000	-0.250000000	2
04	0.707106781	-0.875000000	18
05	1.252273640	0.601264694	38
06	1.154700538	0.000000000	125
07	1.245000792	-0.677936225	254
08	1.497966403	0.684610407	580
09	1.329313803	0.051332484	1060
10	1.450019934	-0.646232158	2021
11	1.045790840	0.535465132	3374
12	1.332869268	-0.031280024	5734

gem: dabchefgkijnlmposqrutwv
kspedumihqabvontjgwcfrl
h0 v46 mgrwjtbavplkhdiuocfseqn

U[567] edges: 8 blocks: 1 orient: +

U[716] edges: 8 blocks: 1 orient: -

8_{85} (0) 2^1 5 blinks

$r_?^{48}$ #ts(full) 965

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	2
04	0.923879533	0.500000000	18
05	0.000000000	0.000000000	38
06	0.912870929	0.602416382	125
07	0.000000000	0.000000000	254
08	0.520708460	0.904914787	580
09	0.000000000	0.000000000	1060
10	1.271727804	-0.724788912	2021
11	0.000000000	0.000000000	3374
12	0.521634598	0.075166792	5734

gem: dabcgefjhimklpnosqrvtuxw
jwmodshgrabtplecvufnxqki
h0 v48 utelwomfnvjdxshqpbirakcg

U[569] edges: 8 blocks: 1 orient: +

U[731] edges: 8 blocks: 2 orient: +

U[672] edges: 8 blocks: 2 orient: -

U[1384] edges: 9 blocks: 2 orient: -

U[717] edges: 8 blocks: 1 orient: -

8_{86} (1) 1 blinks

$r_?^{54}$ #ts(partial) 315

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	0.000000000	0.000000000	18
05	0.763932023	0.000000000	38
06	1.000000000	0.000000000	125
07	0.119604943	1.000000000	254
08	0.242640687	1.000000000	580
09	0.954813188	0.000000000	1060
10	0.055728090	0.000000000	2021
11	0.611479723	1.000000000	3374
12	0.411542732	0.000000000	5734

gem: dabcgefjhimklpnosqrvtuywxAz
jzxsdthgfacwnmuqpoeArlvkbyi
h0 v54 lqvhrwAmupjydifkbxzsncoeatg

U[573] edges: 8 blocks: 1 orient: +

8_{87} (0) 2 blinks

$r_?^{42}$ #ts(full) 4

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	26
05	1.203001910	0.000000000	88
06	0.288675135	0.000000000	287
07	0.484284102	0.000000000	752
08	1.273733916	0.000000000	1824
09	1.113570403	0.000000000	3948
10	1.447213596	0.000000000	8037
11	1.431700179	0.000000000	15232
12	1.373611625	0.000000000	27562

gem: dabchefgkijnlmqopsrut
humedcjrqglkftnaspiob
h0 v42 jiglroqbhatupefmcnksd

U[583] edges: 8 blocks: 1 orient: +

U[744] edges: 8 blocks: 1 orient: +

8_{88} (1) 2^1 1 blinks

$r_?^{46}$ #ts(full) 21

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	1.000000000	-0.625000000	30
05	0.000000000	0.000000000	96
06	1.000000000	-0.500000000	339
07	0.000000000	0.000000000	852
08	0.862555092	0.562500000	2156
09	0.000000000	0.000000000	4548
10	2.048011066	0.600000000	9493
11	0.000000000	0.000000000	17688
12	2.753959524	-0.375000000	32538

gem: dabcgefjhimklpnosqrutwv
jtwedvmgloqihuakpfbsnrc
h0 v46 qieulbwpfsjtnmgvadkcrho

8_{89} (0) 2^1 1 blinks

$r_?^{42}$ #ts(full) 1

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	0.382683432	1.000000000	26
05	0.000000000	0.000000000	96
06	0.788675135	1.000000000	315
07	0.000000000	0.000000000	856
08	0.137949690	0.000000000	2096
09	0.000000000	0.000000000	4612
10	0.109673444	1.000000000	9449
11	0.000000000	0.000000000	18072
12	0.402875905	0.000000000	32834

gem: dabcgefjhimklpnosqrut
mruedthgpkjoafsinblqc
h0 v42 sikgcoqrlapbumfedtjhn

U[590] edges: 8 blocks: 1 orient: +

8_{90} (0) 3^1 2 blinks

$r_?^{42}$ #ts(full) 45

r	mod	theta/pi	#sts
03	0.707106781	-0.500000000	4
04	0.500000000	-0.750000000	48
05	1.026053802	0.142016670	172
06	0.500000000	0.500000000	765
07	0.661566035	-0.807277960	2148
08	1.003135866	0.875000000	6400
09	2.022048832	-0.342432055	14788
10	1.052786404	0.715966660	34965
11	2.152141863	-0.022806909	70420
12	1.800284812	0.761846816	143280

gem: dabcgefjhimklpnosqrut
jonldrhgqtsecmbupfkai
h0 v42 qhfpnctmsojguekradilb

U[593] edges: 8 blocks: 2 orient: +

U[3422] edges: 9 blocks: 5 orient: +

8_{91} (0) 3^1 4 blinks

$r_?^{36}$ #ts(full) 58

r	mod	theta/pi	#sts
03	0.707106781	0.500000000	4
04	0.500000000	0.750000000	48
05	1.292602179	-0.845931659	172
06	0.500000000	-0.500000000	765
07	0.821368278	-0.388466100	2148
08	1.385819299	0.125000000	6400
09	1.071908979	0.287178207	14788
10	1.670820393	0.691863317	34965
11	1.774062988	-0.821570848	70420
12	1.541103501	-0.630073469	143280

gem: dabcgefjhimklpnorq
jplkdmrgnaecoiqbfh
h0 v36 honqlcmpdkjrgfbaie

U[596] edges: 8 blocks: 2 orient: +

U[2438] edges: 9 blocks: 1 orient: -

U[3423] edges: 9 blocks: 5 orient: -

U[3426] edges: 9 blocks: 4 orient: +

8_{92} (0) 3^1 6 blinks

$r_?^{40}$ #ts(full) 22

r	mod	theta/pi	#sts
03	0.707106781	-0.500000000	4
04	0.500000000	0.250000000	30
05	0.229752921	-0.900000000	104
06	0.500000000	0.500000000	367
07	0.424034059	0.839893494	960
08	0.303427098	0.375000000	2440
09	0.150724900	0.988211040	5248
10	0.052786404	0.800000000	10997
11	0.705671670	0.488471510	20712
12	0.626856596	-0.190742068	38206

gem: dabchefgkijnlmporqts
hrtedslpnqgkfbjaoimc
h0 v40 jgomtpbihareqcnfdskl

U[597] edges: 8 blocks: 1 orient: +

U[2549] edges: 9 blocks: 2 orient: +

U[2732] edges: 9 blocks: 3 orient: -

U[3292] edges: 9 blocks: 2 orient: +

U[3323] edges: 9 blocks: 3 orient: -

U[3419] edges: 9 blocks: 4 orient: +

8_{93} (0) 8^1 1 blinks

$r_?^{34}$ #ts(full) 3

r	mod	theta/pi	#sts
03	1.000000000	0.250000000	4
04	1.000000000	0.625000000	40
05	0.698239801	-0.904068341	140
06	0.577350269	-0.666666667	515
07	0.541082418	0.039498927	1376
08	0.585786438	0.437500000	3504
09	0.741153355	0.509459157	7680
10	0.211145618	0.200000000	16005
11	0.636946926	0.359266772	30580
12	0.948460122	0.574640676	56056

gem: dabcgefjhimklonqp
jmpednhgkaifqlcob
h0 v34 kjgpbinamehqfcldo

U[622] edges: 8 blocks: 1 orient: +

8_{94} (0) 3^1 2 blinks

$r_?^{32}$ #ts(full) 1

r	mod	theta/pi	#sts
03	0.707106781	0.500000000	4
04	0.500000000	-0.250000000	18
05	0.601500955	-0.100000000	52
06	0.500000000	-0.500000000	141
07	0.615744528	-0.476828893	320
08	0.461939766	0.625000000	680
09	1.175504102	0.833333333	1312
10	0.361803399	-0.800000000	2405
11	0.970350001	-0.005902439	4148
12	0.790569415	0.147583618	6882

gem: dabchefgjilknmpo
jpfedcbkhniolamg
h0 v32 glimnjadpkfbhoec

U[3134] edges: 8 blocks: 7 orient: +

8_{95} (0) 8^1 9 blinks

$r_?^{36}$ #ts(full) 80

r	mod	theta/pi	#sts
03	1.000000000	0.250000000	2
04	0.000000000	0.000000000	18
05	0.324919696	-0.050000000	34
06	0.577350269	0.666666667	115
07	0.835813012	-0.936455300	196
08	0.292893219	-0.812500000	452
09	0.793179195	0.698046372	708
10	0.690212433	0.875632347	1333
11	0.242715932	0.112367866	1958
12	0.517638090	0.458333333	3254

gem: dabcgefjhimklpnorq
jmpedcrgoainblkqfh
h0 v36 ofhjrbnceqpdgmakli

U[649] edges: 8 blocks: 3 orient: +

U[1304] edges: 9 blocks: 2 orient: +

U[2924] edges: 9 blocks: 2 orient: +

U[872] edges: 9 blocks: 1 orient: +

U[1927] edges: 9 blocks: 1 orient: -

U[2995] edges: 9 blocks: 1 orient: -

U[960] edges: 9 blocks: 2 orient: +

U[2047] edges: 9 blocks: 1 orient: +

U[3340] edges: 9 blocks: 4 orient: +

8_{96} (1) 13 blinks

$r_?^{42}$ #ts(full) 65

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	0.000000000	0.000000000	18
05	0.618033989	0.200000000	34
06	1.000000000	0.000000000	115
07	0.801937736	0.000000000	196
08	0.414213562	-0.250000000	452
09	0.446475588	-0.611111111	708
10	0.618033989	-0.600000000	1333
11	0.295353082	-0.584772865	1958
12	0.517638090	-0.750000000	3254

gem: dabcgefjhimklpnosqrut
junrdmlgkaqhfstipecob
h0 v42 oslpitamunjcrkgdfhbqe

U[660] edges: 8 blocks: 2 orient: +

U[1764] edges: 9 blocks: 2 orient: +

U[2048] edges: 9 blocks: 1 orient: +

U[2812] edges: 9 blocks: 1 orient: -

U[2994] edges: 9 blocks: 1 orient: -

U[700] edges: 8 blocks: 3 orient: +

U[1834] edges: 9 blocks: 2 orient: +

U[2563] edges: 9 blocks: 1 orient: -

U[2813] edges: 9 blocks: 1 orient: -

U[1403] edges: 9 blocks: 3 orient: +

U[1932] edges: 9 blocks: 1 orient: -

U[2565] edges: 9 blocks: 1 orient: -

U[2919] edges: 9 blocks: 2 orient: +

8_{97} (0) 8^1 1 blinks

$r_?^{32}$ #ts(full) 5

r	mod	theta/pi	#sts
03	1.000000000	-0.750000000	4
04	0.000000000	0.000000000	18
05	0.324919696	0.550000000	52
06	0.577350269	0.000000000	141
07	0.835813012	0.920687558	320
08	0.707106781	-0.312500000	680
09	0.228013429	0.416666667	1312
10	0.170820393	0.800000000	2405
11	0.548528732	0.250000000	4148
12	1.000000000	-0.791666667	6882

gem: dabcgefjhilknmpo
jlpedchgoainkbmf
h0 v32 oknhajmpcfbglied

U[674] edges: 8 blocks: 5 orient: +

8_{98} (0) 10^1 4 blinks

r_{1918}^{30} #ts(full) 2

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	0.382683432	0.500000000	18
05	0.000000000	0.000000000	52
06	0.912870929	0.397583618	141
07	0.000000000	0.000000000	320
08	0.287265358	0.750000000	680
09	0.000000000	0.000000000	1312
10	0.707106781	0.050000000	2405
11	0.000000000	0.000000000	4148
12	0.132757063	0.231939494	6882

gem: dabcgefjhimklon
jomedchglabnfik
h0 v30 nlifhdcogkjbame

U[675] edges: 8 blocks: 5 orient: +

U[2078] edges: 9 blocks: 3 orient: -

U[1359] edges: 9 blocks: 3 orient: +

U[1873] edges: 9 blocks: 2 orient: +

8_{99} (0) 8^1 4 blinks

r_1^{20} #ts(full) 3

r	mod	theta/pi	#sts
03	1.000000000	-0.750000000	4
04	1.000000000	0.625000000	24
05	0.850650808	-0.050000000	76
06	0.577350269	-0.666666667	225
07	0.327985278	0.678571429	536
08	0.000000000	0.000000000	1184
09	0.228013429	0.416666667	2344
10	0.447213595	-0.200000000	4385
11	0.548528732	-0.840909091	7676
12	0.577350269	0.541666667	12888

gem: cabfdehgji
heicjgfadb
h0 v20 gifjahecbd

U[690] edges: 8 blocks: 7 orient: +

U[2598] edges: 9 blocks: 7 orient: +

U[3130] edges: 9 blocks: 5 orient: -

8_{100} (0) 10^1 8 blinks

r^{24}_{25} #ts(full) 7

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	0.923879533	0.000000000	24
05	0.000000000	0.000000000	76
06	0.788675135	0.000000000	225
07	0.000000000	0.000000000	536
08	0.392847479	0.000000000	1184
09	0.000000000	0.000000000	2344
10	0.000000000	0.000000000	4385
11	0.000000000	0.000000000	7676
12	0.351468575	1.000000000	12888

gem: dabcgefjhilk
jikedclgbafh
h0 v24 khjfldcbagie

U[1067] edges: 9 blocks: 1 orient: +

U[2875] edges: 9 blocks: 6 orient: +

U[1065] edges: 9 blocks: 2 orient: +

U[2879] edges: 9 blocks: 6 orient: +

U[2904] edges: 9 blocks: 5 orient: +

U[3035] edges: 9 blocks: 4 orient: +

8_{101} (0) 2^1 5 blinks

$r^{40}_{?}$ #ts(full) 236

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	2
04	0.923879533	-0.500000000	18
05	0.000000000	0.000000000	34
06	0.788675135	1.000000000	115
07	0.000000000	0.000000000	196
08	1.419407413	-0.250000000	452
09	0.000000000	0.000000000	708
10	0.502778683	0.733480848	1333
11	0.000000000	0.000000000	1958
12	1.388919959	-0.344126903	3254

gem: dabcgefjhimklpnorqts
jsqedphgfmioactknbrl
h0 v40 pogknjsltrdhembaifcq

U[696] edges: 8 blocks: 4 orient: +

U[2774] edges: 9 blocks: 2 orient: -

U[1322] edges: 9 blocks: 3 orient: +

U[2923] edges: 9 blocks: 2 orient: +

U[2561] edges: 9 blocks: 1 orient: -

8_{102} (1) 1 blinks

$r^{36}_{?}$ #ts(full) 1

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	1.000000000	0.000000000	18
05	0.381966011	0.000000000	34
06	0.000000000	0.000000000	115
07	1.048917340	1.000000000	196
08	1.828427125	1.000000000	452
09	1.758770483	1.000000000	708
10	0.854101966	1.000000000	1333
11	0.250184027	0.000000000	1958
12	0.535898385	0.000000000	3254

gem: dabcgefjhimklpnorq
mrnedphgfkjoacqilb
h0 v36 oqiknhjflbpcemrdga

U[712] edges: 8 blocks: 1 orient: +

8_{103} (1) 1 blinks

$r^{44}_{?}$ #ts(full) 4

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	1.000000000	0.000000000	18
05	1.381966011	0.000000000	34
06	1.000000000	0.000000000	115
07	1.396124528	0.000000000	196
08	1.171572875	0.000000000	452
09	1.319955209	0.000000000	708
10	1.527864045	0.000000000	1333
11	1.289266675	0.000000000	1958
12	0.339745962	0.000000000	3254

gem: dabchefgkijnlmporqtsvu
huktdnvabfrsqpmjocleig
h0 v44 jpfmncovhsqkretbldaugi

U[714] edges: 8 blocks: 1 orient: +

8_{104} (0) $2^1 4^1$ 1 blinks

$r^{36}_{?}$ #ts(full) 320

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	0.541196100	-0.625000000	22
05	0.000000000	0.000000000	64
06	0.422649731	1.000000000	189
07	0.000000000	0.000000000	428
08	0.741499510	0.537946406	952
09	0.000000000	0.000000000	1828
10	0.666058497	0.144129685	3445
11	0.000000000	0.000000000	5912
12	0.590472357	-0.099434921	9990

gem: dabcgefjhimklpnorq
jqmldkhgpanecfbroi
h0 v36 hpofidnmerjqalcbgk

U[722] edges: 8 blocks: 3 orient: +

8_{105} (0) 3^1 2 blinks

r^{30}_{6} #ts(full) 9

r	mod	theta/pi	#sts
03	0.707106781	0.500000000	4
04	0.500000000	0.750000000	28
05	0.601500955	-0.500000000	116
06	0.500000000	-0.500000000	459
07	0.615744528	-0.523171107	1188
08	0.461939766	-0.875000000	3128
09	0.266465147	-0.500000000	6780
10	0.361803399	0.000000000	14637
11	0.970350001	-0.085006652	27412
12	0.612372436	0.000000000	51348

gem: cabfdeighljkomn
ioncmgfjlheakdb
h0 v30 jeoliakmbfndhgc

U[733] edges: 8 blocks: 5 orient: +

U[3366] edges: 9 blocks: 6 orient: -

8_{106} (0) 2^2 1 blinks

$r_?^{36}$ #ts(full) 113

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	1.707106781	0.000000000	46
05	0.000000000	0.000000000	152
06	2.081665999	-0.312832958	623
07	0.000000000	0.000000000	1580
08	2.281536689	-0.730905522	4308
09	0.000000000	0.000000000	9084
10	2.532627340	0.805800803	19809
11	0.000000000	0.000000000	36784
12	2.843452093	0.335751608	69610

gem: dabcgefjhimklpnorq
jmlrdohgnaipbkfqce
h0 v36 njfklcbpmroeqadhig

U[757] edges: 8 blocks: 3 orient: +

8_{107} (0) 2^1 1 blinks

$r_?^{48}$ #ts(partial) 398

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	2
04	0.925879533	0.500000000	34
05	0.000000000	0.000000000	66
06	0.912870929	-0.602416382	309
07	0.000000000	0.000000000	552
08	0.406475733	-0.454486749	1576
09	0.000000000	0.000000000	2600
10	1.331584203	-0.033587760	5725
11	0.000000000	0.000000000	8850
12	2.194245945	0.807314817	16626

gem: dabcgefjhimklpnosqrvtuxw
mwsrdvhgfpjoauxktecqbinl
h0 v48 urivswpncqfatmjgobxhldke

U[740] edges: 8 blocks: 2 orient: +

8_{108} (0) 2^1 2 blinks

$r_?^{42}$ #ts(full) 45

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	2
04	0.382683432	1.000000000	34
05	0.000000000	0.000000000	66
06	0.912870929	-0.602416382	309
07	0.000000000	0.000000000	552
08	1.447463500	-0.407703062	1576
09	0.000000000	0.000000000	2600
10	1.070166122	0.192048445	5725
11	0.000000000	0.000000000	8850
12	1.451904657	0.239596708	16626

gem: dabcgefjhimklpnosqrut
mtqedohgfnjuasicpbkrl
h0 v42 ohktlsnbqeujgmrdiafpc

U[741] edges: 8 blocks: 2 orient: +

U[3195] edges: 9 blocks: 3 orient: -

8_{109} (0) 8^1 1 blinks

$r_?^{44}$ #ts(partial) 518

r	mod	theta/pi	#sts
03	1.000000000	0.250000000	2
04	1.000000000	0.625000000	34
05	1.118691576	-0.739085396	66
06	0.577350269	0.000000000	309
07	0.681982112	0.201239215	552
08	0.171572875	0.437500000	1576
09	1.289098911	0.533476290	2600
10	1.291704235	-0.778851736	5725
11	1.553816540	-0.438511604	8850
12	1.485261448	0.216027550	16626

gem: dabcgefjhimklpnorqtsvu
jqtedcugvarsnmlbpiofhk
h0 v44 evhrodqsupjgtiaklfcmnb

U[742] edges: 8 blocks: 2 orient: +

8_{110} (0) 4^1 4 blinks

$r_?^{40}$ #ts(full) 2

r	mod	theta/pi	#sts
03	1.000000000	-0.250000000	2
04	0.707106781	-0.375000000	34
05	1.428399533	-0.636167270	66
06	0.577350269	1.000000000	309
07	1.310154813	0.985545313	552
08	1.840119281	0.526597915	1576
09	0.686584660	0.285238396	2600
10	1.523474868	0.020993659	5725
11	0.720214712	-0.496204924	8850
12	0.939178884	-0.101474116	16626

gem: dabcgefjhimklpnorqts
jqnkdmhgsaecplbtoirf
h0 v40 sfhmpbaceojrdqkintgl

U[743] edges: 8 blocks: 2 orient: +

U[3237] edges: 9 blocks: 3 orient: +

U[777] edges: 8 blocks: 2 orient: -

U[3191] edges: 9 blocks: 3 orient: +

8_{111} (2) 2^1 1 blinks

r_{311}^{28} #ts(full) 5

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	8
04	1.473625758	-0.784305834	40
05	0.000000000	0.000000000	152
06	1.880398464	0.293951872	475
07	0.000000000	0.000000000	1280
08	2.236067977	-0.664916382	3072
09	0.000000000	0.000000000	6720
10	2.554968502	0.360740116	13629
11	0.000000000	0.000000000	25960
12	2.846229175	-0.621583348	46904

gem: dabcgefjhilknm
jmledchgnabfki
h0 v28 nfihkbalcejmdg

U[746] edges: 8 blocks: 3 orient: +

8_{112} (1) 4^1 1 blinks

$r_?^{42}$ #ts(partial) 845

r	mod	theta/pi	#sts
03	1.414213562	-0.250000000	4
04	1.000000000	-0.625000000	46
05	1.878260910	0.995931659	152
06	2.645751311	0.439481141	623
07	1.671002411	-0.130313964	1580
08	1.424583185	-0.524070345	4308
09	2.256828220	0.895816559	9084
10	1.199038824	0.236918733	19809
11	0.610994605	0.475790284	36784
12	1.044526044	-0.334059668	69610

gem: dabcgefjhimklpnosqrut
jtrqdpoglasunmhfecbki
h0 v42 selpbhtuarjngcqdokimf

U[755] edges: 8 blocks: 2 orient: +

8_{113} (0) 2^2 5 blinks

$r_?^{32}$ #ts(full) 211

r	mod	theta/pi	#sts
03	1.414213562	0.000000000	4
04	0.707106781	0.250000000	16
05	0.743496069	-0.600000000	44
06	1.527525232	-0.227185526	107
07	0.835813012	0.142857143	224
08	0.736812879	-0.534305834	432
09	1.612078900	-0.144536259	768
10	0.867632644	0.236918733	1293
11	0.778745244	-0.371512295	2068
12	1.656507451	0.014868820	3184

gem: dabcgefjhilknmpo
jnfedcpgmliakobh
h0 v32 fhjnlimbaocpgdke

8_{114} (0) 8^1 8 blinks

$r_?^{36}$ #ts(full) 46

r	mod	theta/pi	#sts
03	1.000000000	-0.250000000	2
04	0.000000000	0.000000000	18
05	1.451059202	-0.107983330	34
06	1.527525232	-0.560518859	115
07	0.206428766	0.936455300	196
08	1.581138830	-0.539916382	452
09	1.845729137	0.958561422	708
10	0.490229767	0.334341190	1333
11	1.550619131	-0.992675693	1958
12	2.000000000	0.458333333	3254

gem: dabcgefjhimklpnorq
jonedmqglacprkbihf
h0 v36 rghlaobmfkjncdiqpe

8_{115} (0) 4^1 4 blinks

$r_?^{40}$ #ts(full) 5

r	mod	theta/pi	#sts
03	1.000000000	-0.250000000	2
04	0.707106781	-0.375000000	18
05	1.973430311	-0.919146580	34
06	1.527525232	0.439481141	115
07	1.506083006	0.134973272	196
08	2.692582404	-0.558618942	452
09	1.657859456	0.800355188	708
10	2.271491751	0.436918733	1333
11	2.948314930	-0.317642587	1958
12	1.471960144	-0.868877146	3254

gem: dabchefgkijnlmqoptrs
koledntihgscbqmrfpaj
h0 v40 gfpsqbarncokhtljemdi

8_{116} (0) 2^1 8 blinks

$r_?^{34}$ #ts(full) 11

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	2
04	0.382683432	1.000000000	18
05	0.000000000	0.000000000	34
06	1.211324865	0.000000000	115
07	0.000000000	0.000000000	196
08	0.551681688	0.825667834	452
09	0.000000000	0.000000000	708
10	1.267911718	-0.118520947	1333
11	0.000000000	0.000000000	1958
12	0.679304748	0.646350005	3254

gem: dabcgefjhimklonqp
jioedcqgmahpblfnk
h0 v34 ojilmhafpbndqkgce

8_{117} (1) 1 blinks

$r_?^{50}$ #ts(partial) 492

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	1.000000000	0.000000000	18
05	1.381966011	0.000000000	34
06	1.000000000	0.000000000	115
07	2.643104132	0.000000000	196
08	2.171572875	0.000000000	452
09	2.199340451	0.000000000	708
10	2.763932023	0.000000000	1333
11	2.079087774	0.000000000	1958
12	4.071796770	0.000000000	3254

gem: dabchefgkijnlmporqustwvyx
kjnydmqohvatfxwgpsrlbuice
h0 v50 msfircbupeykwondhjgvqxatl

8_{118} (0) 8^1 5 blinks

$r^{32}_{?}$ #ts(full) 1083

r	mod	theta/pi	#sts
03	1.000000000	-0.250000000	2
04	0.000000000	0.000000000	3
05	0.850650808	0.650000000	4
06	0.577350269	0.666666667	5
07	0.327985278	-0.250000000	6
08	0.707106781	-0.187500000	7
09	0.228013429	-0.083333333	8
10	0.447213596	1.000000000	9
11	0.548528732	-0.886363636	10
12	0.000000000	0.000000000	11

gem: dabcgefjhilknmpo
jmledpkgbnhoiacf
h0 v32 hkgfndclepjaoimb

9_1 (0) 9^1 1 blinks

$r^{56}_{?}$ #ts(partial) 844

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	1.000000000	258
05	0.371748034	-0.600000000	514
06	0.500000000	0.500000000	7075
07	1.032991532	-0.156661084	13636
08	0.191341716	-0.500000000	79172
09	0.000000000	0.000000000	144708
10	0.138196601	-0.800000000	535333
11	1.054886862	-0.743518924	925958
12	0.612372436	0.750000000	2605574

gem: dabchefglijknmqopsrutwvzxyBA
hjzydvnofBrtlgsukqampAxwecib
h0 v56 fyxAzatrhsoBwknjgipqvudlbemc

9_2 (2) 1 blinks

r^{30}_{1688} #ts(full) 1

r	mod	theta/pi	#sts
03	1.414213562	0.000000000	8
04	2.000000000	0.000000000	92
05	2.182643357	0.175632347	600
06	1.732050808	0.333333333	3157
07	1.846132745	0.618686323	13096
08	2.164784401	1.000000000	46456
09	2.953589096	-0.774585556	142952
10	4.338163219	-0.563081267	395789
11	4.809462542	-0.364502960	997560
12	5.216837194	-0.195021719	2333548

gem: dabcgefjhimklon
jokedmhglacnfib
h0 v30 lnfhkibmcejodga

9_3 (0) 9^1 15 blinks

$r^{38}_{?}$ #ts(full) 22

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	42
05	0.371748034	-0.200000000	192
06	0.500000000	0.500000000	787
07	0.473952458	0.527830415	2780
08	0.191341716	1.000000000	8272
09	0.461531173	0.388888889	22556
10	0.138196601	0.400000000	55101
11	0.194241558	-0.132744812	125868
12	0.970560301	-0.218880895	267062

gem: dabcgefjhimklonqpsr
jrmpdnhgsabfolqecki
h0 v38 qohmrapcnsjgdeblfik

9_4 (0) 7^1 3 blinks

$r^{40}_{?}$ #ts(full) 1

r	mod	theta/pi	#sts
03	0.707106781	-0.500000000	4
04	0.500000000	0.750000000	42
05	0.493730098	-0.245931659	192
06	0.288675135	0.000000000	787
07	0.314692123	-0.642857143	2780
08	0.191341716	-0.875000000	8272
09	0.402052123	-0.508703911	22556
10	0.243769410	-0.508136683	55101
11	0.119834158	0.888468310	125868
12	0.714957726	0.845511799	267062

gem: dabcgefjhimklpnosqrut
jspedcmglaothrkfiubqn
h0 v42 etioudlsrbjgnmfqpchka

9_5 (0) 11^1 14 blinks

r^{24}_{22} #ts(full) 10

r	mod	theta/pi	#sts
03	0.707106781	0.500000000	4
04	0.500000000	0.750000000	42
05	0.371748034	0.700000000	192
06	0.288675135	1.000000000	787
07	0.417906506	0.928571429	2780
08	0.461939766	-0.875000000	8272
09	0.464242827	-0.500000000	22556
10	0.138196601	-0.400000000	55101
11	0.000000000	0.000000000	125868
12	0.105662433	-0.750000000	267062

gem: dabcgefjhilk
jikedclgbafh
h0 v24 ehlfidkbagjc

U[2432] edges: 9 blocks: 1 orient: +

U[2974] edges: 9 blocks: 1 orient: +

U[3398] edges: 9 blocks: 6 orient: +

U[2507] edges: 9 blocks: 1 orient: +

U[3324] edges: 9 blocks: 8 orient: -

9_6 (0) 26 blinks

$r_?^{36}$ #ts(full) 1087

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	42
05	0.573741760	-0.524367653	192
06	0.288675135	0.000000000	787
07	0.145967181	0.813544701	2780
08	0.732537816	1.000000000	8272
09	0.091198988	-0.488211040	22556
10	0.329179607	-0.951264694	55101
11	0.275134229	-0.882615800	125868
12	0.785383335	-0.219672871	267062

gem: dabcgefjhimklpnorq
jkoedchgrapinmqbfl
h0 v36 fehloadmnrjgcibqpk

U[809] edges: 9 blocks: 2 orient: +

U[1378] edges: 9 blocks: 1 orient: +

U[1678] edges: 9 blocks: 2 orient: -

U[1793] edges: 9 blocks: 1 orient: -

U[1887] edges: 9 blocks: 1 orient: -

U[1224] edges: 9 blocks: 2 orient: +

U[1456] edges: 9 blocks: 1 orient: +

U[1692] edges: 9 blocks: 2 orient: -

U[1811] edges: 9 blocks: 1 orient: -

U[1888] edges: 9 blocks: 1 orient: -

U[1254] edges: 9 blocks: 1 orient: +

U[1637] edges: 9 blocks: 2 orient: -

U[1708] edges: 9 blocks: 1 orient: +

U[1860] edges: 9 blocks: 1 orient: -

U[1986] edges: 9 blocks: 1 orient: +

U[2164] edges: 9 blocks: 1 orient: +

U[2423] edges: 9 blocks: 1 orient: +

U[2835] edges: 9 blocks: 1 orient: -

U[3039] edges: 9 blocks: 1 orient: -

U[2267] edges: 9 blocks: 1 orient: -

U[2768] edges: 9 blocks: 2 orient: +

U[2946] edges: 9 blocks: 1 orient: -

U[3067] edges: 9 blocks: 1 orient: +

U[2346] edges: 9 blocks: 1 orient: +

U[2784] edges: 9 blocks: 1 orient: +

U[3007] edges: 9 blocks: 2 orient: +

9_7 (0) 9^1 4 blinks

$r_?^{54}$ #ts(full) 3

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	0.000000000	34
05	0.655738262	0.508136683	102
06	0.500000000	-0.500000000	465
07	0.350555488	-0.622352330	1278
08	0.798195913	0.000000000	3756
09	0.517506430	0.627818679	8652
10	0.429992669	0.983726635	20289
11	0.706387907	-0.933097788	40950
12	0.372135762	0.026623229	82566

gem: dabchefgkijnlmqopsrutxvwzyBA
hiwedvpjsalkgAnBtqzrfucyxbom
h0 v56 AtfnkyuqhxmzesgvijdbopaBclwr

U[825] edges: 9 blocks: 1 orient: +

U[2821] edges: 9 blocks: 1 orient: +

U[1204] edges: 9 blocks: 1 orient: +

U[1414] edges: 9 blocks: 1 orient: +

9_8 (0) 5^1 19 blinks

$r_?^{36}$ #ts(full) 445

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	0.500000000	34
05	0.831253876	1.000000000	102
06	0.288675135	1.000000000	465
07	0.407556913	0.063444593	1278
08	0.079256334	-0.250000000	3756
09	0.632843492	-0.092997653	8652
10	0.690983006	0.000000000	20289
11	0.449679199	0.778399886	40950
12	0.538030402	-0.738153184	82566

gem: dabcgefjhimklpnorq
jmlrdqognaicbkhfpe
h0 v36 flkjnadqogpbemirhc

U[828] edges: 9 blocks: 1 orient: +

U[1197] edges: 9 blocks: 1 orient: +

U[1805] edges: 9 blocks: 1 orient: -

U[916] edges: 9 blocks: 1 orient: -

U[1207] edges: 9 blocks: 1 orient: +

U[1866] edges: 9 blocks: 1 orient: -

U[1028] edges: 9 blocks: 1 orient: -

U[1416] edges: 9 blocks: 1 orient: +

U[1988] edges: 9 blocks: 1 orient: +

U[2182] edges: 9 blocks: 1 orient: +

U[2421] edges: 9 blocks: 1 orient: +

U[3087] edges: 9 blocks: 1 orient: +

U[2273] edges: 9 blocks: 1 orient: -

U[2823] edges: 9 blocks: 1 orient: +

U[3114] edges: 9 blocks: 1 orient: +

9_9 (0) 5^1 13 blinks

$r_?^{50}$ #ts(full) 5

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	-0.500000000	34
05	0.580414541	-0.154068341	102
06	0.288675135	1.000000000	465
07	0.401429925	-0.130180323	1278
08	0.237769002	0.250000000	3756
09	0.503812390	-0.186353777	8652
10	0.336881039	0.308136683	20289
11	0.326113988	0.550897017	40950
12	0.548073308	0.450470986	82566

gem: dabcgefjhimklpnosqrutwvyx
jqoxdnhglapwfmytuvksbriec
h0 v50 qpurtoicykjfsalvndmwxbehg

U[829] edges: 9 blocks: 1 orient: +

U[1244] edges: 9 blocks: 1 orient: +

U[1648] edges: 9 blocks: 1 orient: +

U[1206] edges: 9 blocks: 1 orient: +

U[1417] edges: 9 blocks: 1 orient: +

U[2178] edges: 9 blocks: 1 orient: +

U[1208] edges: 9 blocks: 1 orient: +

U[1555] edges: 9 blocks: 1 orient: +

U[2488] edges: 9 blocks: 1 orient: +

U[2678] edges: 9 blocks: 1 orient: +

U[2967] edges: 9 blocks: 1 orient: -

U[2723] edges: 9 blocks: 1 orient: +

U[2822] edges: 9 blocks: 1 orient: +

9_{10} (0) 26 blinks

$r_?^{46}$ #ts(full) 2

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	0.000000000	34
05	0.305141982	0.254068341	102
06	0.288675135	0.000000000	465
07	0.953331947	-0.779564149	1278
08	0.032829048	0.000000000	3756
09	0.085823189	-0.716886245	8652
10	0.093111629	-0.508136683	20289
11	0.453669446	-0.480073829	40950
12	0.264237769	0.658751572	82566

gem: dabcgefjhimklpnosqrvtuxw
mvpedwhgfojuqbkxaltsrnic
h0 v48 wlioubkqcesfnmxhptvrjgad

U[833] edges: 9 blocks: 1 orient: +

U[915] edges: 9 blocks: 1 orient: +

U[1027] edges: 9 blocks: 1 orient: +

U[1213] edges: 9 blocks: 1 orient: +

U[1489] edges: 9 blocks: 2 orient: +

U[1980] edges: 9 blocks: 1 orient: +

U[2257] edges: 9 blocks: 1 orient: -

U[2335] edges: 9 blocks: 1 orient: +

U[1214] edges: 9 blocks: 1 orient: +

U[1640] edges: 9 blocks: 1 orient: +

U[2157] edges: 9 blocks: 1 orient: -

U[2275] edges: 9 blocks: 1 orient: +

U[2338] edges: 9 blocks: 1 orient: +

U[1422] edges: 9 blocks: 1 orient: +

U[1802] edges: 9 blocks: 1 orient: +

U[2214] edges: 9 blocks: 1 orient: -

U[2297] edges: 9 blocks: 1 orient: -

U[2376] edges: 9 blocks: 1 orient: +

U[2415] edges: 9 blocks: 1 orient: +

U[2720] edges: 9 blocks: 1 orient: +

U[3124] edges: 9 blocks: 1 orient: +

U[2416] edges: 9 blocks: 1 orient: +

U[2963] edges: 9 blocks: 1 orient: -

U[3127] edges: 9 blocks: 1 orient: +

U[2479] edges: 9 blocks: 1 orient: +

U[3109] edges: 9 blocks: 1 orient: -

9_{11} (0) 9 blinks

$r_?^{46}$ #ts(full) 2

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	1.000000000	34
05	0.843294502	-0.516570011	102
06	0.288675135	0.000000000	465
07	0.581997645	0.758563280	1278
08	0.349854384	-0.500000000	3756
09	0.473490226	0.135330958	8652
10	0.711145618	-0.966859979	20289
11	1.134259308	-0.799752979	40950
12	0.144164812	0.761846816	82566

gem: dabchefgkijnlmposqrutwv
kvsedrnihmwqugblpfcojta
h0 v46 orfiwjbupclkesndtgaqvhm

9_{12} (0) 9^1 1 blinks

$r_?^{62}$ #ts(partial) 1048

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	0.000000000	130
05	1.010030996	0.086167270	258
06	0.500000000	-0.500000000	2445
07	0.910396122	-0.572808756	4632
08	0.732537816	0.000000000	21016
09	1.389243773	-0.311970276	37400
10	1.020162612	-0.172334540	115525
11	2.071475809	0.121516780	193650
12	1.579821153	-0.138311615	473586

gem: dabchefglijkomnqpsrvtuxwzyBAECD
onBedcAyhpvDlCajwqtsgEzixrufbmk
h0 v62 CynDEpbBrcutwjfoliexkmvqgazhAds

9_{13} (0) 3^1 3 blinks

$r_?^{38}$ #ts(full) 2

r	mod	theta/pi	#sts
03	0.707106781	0.500000000	2
04	0.500000000	0.750000000	130
05	1.292602179	-0.954068341	258
06	0.500000000	-0.500000000	2445
07	0.897862870	-0.308548298	4632
08	1.385819299	0.125000000	21016
09	0.955458580	0.394499850	37400
10	1.670820393	0.908136683	115525
11	1.389621627	-0.650410971	193650
12	1.028597444	-0.388311615	473586

gem: eabcdifghljkomnqpsr
ipskfejqaodrlbgnhmc
h0 v38 rgfmqnbasieopcldkhj

9_{14} (0) 1 blinks

$r_?^{64}$ #ts(partial) 682

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	1.000000000	66
05	0.925766521	0.494236944	134
06	0.288675135	0.000000000	869
07	0.605410948	-0.747860003	1790
08	0.508367052	0.500000000	6148
09	0.324895040	-0.680627595	12196
10	0.857043652	-0.988473887	30509
11	0.617088249	0.947314361	56702
12	0.704653655	-0.983776769	118150

gem: dabchefglijkomnqptrswuvyxBzADCFE
hsledutaAzFvfyjoBqDgmcxwEpiCrbnk
h0 v64 AqfnoDprhwdmlkCFbiEytxBzuvsjecag

9_{15} (0) 3^1 8 blinks

$r_?^{38}$ #ts(full) 4

r	mod	theta/pi	#sts
03	0.707106781	0.500000000	2
04	0.500000000	0.750000000	66
05	0.601500955	0.700000000	134
06	0.500000000	-0.500000000	869
07	0.191574400	-0.818889494	1790
08	0.079256334	0.125000000	6148
09	0.527138749	0.525778371	12196
10	0.361803399	-0.400000000	30509
11	0.588946647	0.787781624	56702
12	0.790569415	-0.852416382	118150

gem: dabcgefjhimklonqpsr
jmsedcqgoainbpkrhlf
h0 v38 lphjindcrgqafmsokeb

9_{16} (0) 5^1 7 blinks

$r_?^{44}$ #ts(full) 97

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	-0.500000000	66
05	0.707106781	0.900000000	134
06	0.288675135	1.000000000	869
07	0.167802087	0.731119064	1790
08	0.079256334	-0.750000000	6148
09	0.326822348	-0.296729159	12196
10	0.500000000	0.200000000	30509
11	0.301177623	0.146188886	56702
12	0.511042610	-0.066291459	118150

gem: dabcgefjhimklpnorqtsvu
jimldqoguasecthfpkrvbn
h0 v44 oftmibucskjrplvdgnehqa

9_{17} (0) 5^1 13 blinks

$r_?^{40}$ #ts(full) 4

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	-0.500000000	66
05	0.270090757	0.700000000	134
06	0.288675135	1.000000000	869
07	1.035485654	0.116808475	1790
08	1.003135866	0.250000000	6148
09	0.622102238	0.223672060	12196
10	0.072949017	0.600000000	30509
11	0.142472197	0.520736523	56702
12	0.479662002	0.624607914	118150

gem: dabcgefjhimklpnorqts
jnsrdthgkopfbmaiceql
h0 v40 rlipsaqtckjbehgdofmn

9_{18} (0) 8 blinks

$r_?^{38}$ #ts(full) 182

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	0.000000000	66
05	0.371748034	0.800000000	134
06	0.288675135	0.000000000	869
07	0.145967181	0.813544701	1790
08	0.191341716	1.000000000	6148
09	0.551244340	0.107270378	12196
10	0.138196601	0.400000000	30509
11	0.706969322	0.079044168	56702
12	1.105662433	0.000000000	118150

gem: dabcgefjhimklonqpsr
gqhedcmfpkjnrsiobal
h0 v38 igrnhoskalejdmqcfpb

9_{19} (0) 11 blinks

$r_?^{42}$ #ts(full) 4

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	0.000000000	66
05	0.459505841	1.000000000	134
06	0.288675135	0.000000000	869
07	0.354254972	-0.945128433	1790
08	0.349854384	1.000000000	6148
09	0.583009562	0.634132551	12196
10	0.211145618	0.000000000	30509
11	0.592946974	0.050296018	56702
12	0.923951980	-0.016902016	118150

gem: dabcgefjhimklpnosqrut
jroednhgmsfpqkctiualb
h0 v42 fihrotdsbujenmlqpgcak

9_{20} (1) 1 blinks

$r_?^{56}$ #ts(partial) 1110

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	4
04	1.000000000	1.000000000	78
05	2.127877827	-0.910914604	288
06	0.000000000	0.000000000	1563
07	1.690746815	0.338488000	4692
08	0.414213562	0.500000000	15740
09	3.512300930	-0.341502324	39396
10	3.102606099	-0.228509529	101821
11	3.074900195	0.784053320	221496
12	5.609287086	0.927420481	484842

gem: dabchefglijknmqoptrsvuxwzyBA
hrlBdAjqbmycgvnwaiputxsokfze
h0 v56 fxojzwBihAsulytmvqkcpraenbdg

9_{21} (1) 5^1 4 blinks

$r_?^{40}$ #ts(partial) 1079

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	4
04	1.000000000	-0.500000000	78
05	1.543361918	-0.524367653	288
06	1.000000000	-0.666666667	1563
07	1.414213562	-0.757883871	4692
08	1.000000000	-0.750000000	15740
09	1.532088886	0.888888889	39396
10	2.127877827	0.910914604	101821
11	1.016298803	0.663727165	221496
12	1.931851653	0.416666667	484842

gem: dabcgefjhimklpnorqts
jmqedchgpaitbfrknsol
h0 v40 sfkonjaelbrihmtqpcgd

9_{22} (1) 5^1 10 blinks

$r_?^{40}$ #ts(full) 99

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	4
04	0.000000000	0.000000000	78
05	0.618033989	0.200000000	288
06	0.000000000	0.000000000	1563
07	1.856082398	0.604603779	4692
08	1.732050808	0.304086724	15740
09	0.446475588	0.277777778	39396
10	1.328131026	0.254068341	101821
11	0.255700272	-0.136363636	221496
12	2.236067978	0.647583618	484842

gem: dabcgefjhimklpnorqts
joqedtkgmahfplrisbcn
h0 v40 qghmsibcfnjrdketploa

U[3409] edges: 9 blocks: 2 orient: +

9_{23} (1) 5^1 7 blinks

r_{21}^{28} #ts(full) 8

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	4
04	0.000000000	0.000000000	78
05	0.618033989	1.000000000	288
06	0.000000000	0.000000000	1563
07	1.000000000	0.000000000	4692
08	1.000000000	0.000000000	15740
09	0.000000000	0.000000000	39396
10	0.618033989	1.000000000	101821
11	0.000000000	0.000000000	221496
12	1.000000000	0.000000000	484842

gem: cabfdeighljknm
inlckgfjamedhb
h0 v28 mdjkanlfcibgeh

U[3308] edges: 9 blocks: 3 orient: +

9_{24} (0) 3^1 1 blinks

$r_?^{64}$ #ts(full) 4

r	mod	theta/pi	#sts
03	0.707106781	0.500000000	2
04	0.500000000	0.750000000	66
05	0.283990228	-0.900000000	134
06	0.500000000	-0.500000000	869
07	0.766566417	-0.570213797	1790
08	0.778965102	0.125000000	6148
09	2.050502153	0.552115235	12196
10	0.080650449	0.800000000	30509
11	0.190789749	-0.910116527	56702
12	0.145502328	1.000000000	118150

gem: gabcdefnhijklmporqtsvuxwzyBADCFE
pDlAjwrgteyBECnavhqxfsuikdzcoFmb
h0 v64 xmvkqoCzfrEusaiepFbltcBnwDgyAhdj

9_{25} (0) 9^1 1 blinks

$r_?^{48}$ #ts(full) 12

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	1.000000000	66
05	0.305141982	-0.345931659	134
06	0.500000000	-0.500000000	869
07	1.743983576	-0.652647478	1790
08	0.349854384	-0.500000000	6148
09	0.969207890	0.494500957	12196
10	0.093111629	0.691863317	30509
11	0.791801469	0.930549613	56702
12	1.433349896	0.993095416	118150

gem: dabcgefjhimklpnosqrvtuxw
jvoednxgltsrwmcupikaqbfh
h0 v48 xskihovmucjpebflawnrdgtq

9_{26} (0) 3^1 1 blinks

$r_?^{66}$ #ts(partial) 448

r	mod	theta/pi	#sts
03	0.707106781	-0.500000000	2
04	0.500000000	0.250000000	34
05	0.739059264	0.395538531	80
06	0.500000000	0.500000000	351
07	1.759536836	0.282056233	908
08	0.396281669	-0.625000000	2482
09	0.391491559	0.752729779	5758
10	0.546208596	0.208922939	12769
11	1.012253070	0.686261330	26080
12	0.853621003	-0.441013101	50800

gem: dabchefgkijnlmqoptrswuvyxBzAECDGF
hFvAdxCaqprkwbnEilDutBmszyecGfjog
h0 v66 CztDvuqBhsoxciwFbpGmfeklEganAdyrj

U[855] edges: 9 blocks: 1 orient: +

9_{27} (0) 3^1 2 blinks

$r_?^{50}$ #ts(full) 3

r	mod	theta/pi	#sts
03	0.707106781	0.500000000	2
04	0.500000000	-0.250000000	34
05	1.227884943	-0.992969343	80
06	0.500000000	-0.500000000	351
07	0.911803623	-0.706581606	908
08	0.079256334	0.625000000	2482
09	0.944714232	0.374807586	5758
10	1.507701433	0.985938687	12769
11	0.310164104	0.589343853	26080
12	0.570930726	-0.287433521	50800

gem: dabchefgkijnlmqopsrutwvyx
kxfedcnihrwbosmyuqgpjtalv
h0 v50 ugqjvnoaeylkcrbsmfpxhitwd

9_{28} (0) 16^1 2 blinks

$r_?^{36}$ #ts(full) 170

r	mod	theta/pi	#sts
03	1.000000000	0.250000000	4
04	0.000000000	0.000000000	136
05	0.525731112	-0.250000000	524
06	1.154700538	0.000000000	3227
07	0.975768883	0.048930693	10304
08	0.000000000	0.000000000	35952
09	0.503666400	-0.788430618	94368
10	0.867632644	-0.563081267	247293
11	0.876991573	-0.520229458	556468
12	0.000000000	0.000000000	1223704

gem: dabcgefjhimklpnorq
jpoedclgraiqnmfbhk
h0 v36 onigcldmeqjfhrakpb

U[860] edges: 9 blocks: 2 orient: +

U[864] edges: 9 blocks: 1 orient: +

9_{29} (0) 16^1 1 blinks

$r_?^{42}$ #ts(full) 687

r	mod	theta/pi	#sts
03	1.000000000	-0.250000000	4
04	0.000000000	0.000000000	136
05	0.525731112	0.250000000	524
06	0.577350269	-0.333333333	3227
07	0.463841228	0.507883871	10304
08	0.000000000	0.000000000	35952
09	0.766167851	0.410953454	94368
10	1.447213596	0.000000000	247293
11	0.959289584	-0.587650487	556468
12	0.000000000	0.000000000	1223704

gem: dabchefgkijmlonqpsrut
hqiedlpomsukcganrbtjf
h0 v42 gfrosbathqnckmpujleid

9_{30} (0) 9^1 1 blinks

$r_?^{50}$ #ts(partial) 768

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	1.000000000	130
05	0.798872081	-0.545931659	258
06	0.500000000	-0.500000000	2445
07	0.521120889	0.428571429	4632
08	0.191341716	-0.500000000	21016
09	0.707106781	-0.833333333	37400
10	0.638196601	-0.908136683	115525
11	1.005212654	-0.842485136	193650
12	0.570930726	0.962566479	473586

gem: dabchefgkijnlmposqrutwvyx
hrtedwnsfvxkqpmgoyacjuilb
h0 v50 evnfxdmphrwbuctiljosgqyak

U[861] edges: 9 blocks: 1 orient: +

9_{31} (0) 5^1 1 blinks

$r_?^{46}$ #ts(partial) 380

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	0.500000000	130
05	0.437016024	0.900000000	258
06	0.288675135	1.000000000	2445
07	0.521120889	1.000000000	4632
08	0.844623199	0.750000000	21016
09	0.606025970	0.666666667	37400
10	0.190983006	0.200000000	115525
11	0.431001021	-0.642902227	193650
12	0.198687476	-0.127285205	473586

gem: dabchefgkijnlmposqrutwv
knsedrqthlvwubmgpfcioaj
h0 v46 ohljvqimnsckbgaufedrwtp

U[862] edges: 9 blocks: 1 orient: +

9_{32} (0) 6^1 1 blinks

$r_?^{38}$ #ts(full) 463

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	0.923879532	-0.750000000	86
05	0.000000000	0.000000000	360
06	0.366025404	-0.500000000	2075
07	0.000000000	0.000000000	6688
08	0.847242829	-0.686517318	23528
09	0.000000000	0.000000000	60784
10	0.294453494	-0.736718154	162761
11	0.000000000	0.000000000	359136
12	0.696876654	-0.386812925	806710

gem: dabcgefjhimklonqpsr
jioqdplgkabhnmsrefc
h0 v38 eqlsndkmogjrpaihbcf

U[863] edges: 9 blocks: 1 orient: +

9_{33} (0) 6^1 3 blinks

$r_?^{32}$ #ts(full) 19

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	0.923879532	0.250000000	86
05	0.000000000	0.000000000	360
06	0.707106781	0.750000000	2075
07	0.000000000	0.000000000	6688
08	0.981319227	-0.829486749	23528
09	0.000000000	0.000000000	60784
10	0.784753747	-0.400000000	162761
11	0.000000000	0.000000000	359136
12	0.866025404	0.125000000	806710

gem: cabfdeighljknmpo
ipncjgfelhmaodkb
h0 v32 nojkiadbpcgmlfhe

U[865] edges: 9 blocks: 1 orient: +

U[1127] edges: 9 blocks: 3 orient: +

U[2900] edges: 9 blocks: 5 orient: -

9_{34} (0) 6^1 5 blinks

$r_?^{34}$ #ts(full) 158

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	0.382683432	-0.250000000	86
05	0.000000000	0.000000000	360
06	0.707106781	0.250000000	2075
07	0.000000000	0.000000000	6688
08	0.720437448	0.537713694	23528
09	0.000000000	0.000000000	60784
10	0.459513428	0.811446319	162761
11	0.000000000	0.000000000	359136
12	0.724744871	-0.695369274	806710

gem: dabcgefjhimklonqp
jmqedcngkaiobhplf
h0 v34 lfiokjaepbqgnmdch

U[868] edges: 9 blocks: 1 orient: +

U[3030] edges: 9 blocks: 4 orient: +

U[1190] edges: 9 blocks: 3 orient: +

U[3274] edges: 9 blocks: 4 orient: +

U[2079] edges: 9 blocks: 3 orient: -

9_{35} (0) 4^1 1 blinks

$r_?^{34}$ #ts(full) 37

r	mod	theta/pi	#sts
03	1.000000000	0.250000000	4
04	0.707106781	0.875000000	102
05	0.811393378	-0.174367653	392
06	0.577350269	0.333333333	2503
07	0.655970555	-0.321428571	7584
08	1.155762275	0.397058248	28264
09	1.133770774	0.977185526	70192
10	0.490229767	-0.134341190	194861
11	0.170990758	0.510200685	418536
12	0.261897795	0.507188760	963670

gem: dabcgefjhimklonqp
jmledcqgnaifbkpoh
h0 v34 kjglbpcaoehdfmqni

9_{36} (0) 3^2 1 blinks

$r_?^{54}$ #ts(full) 33

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	74
05	0.885491183	-0.351264694	288
06	0.866025404	0.000000000	1395
07	0.691041978	-0.407928859	4552
08	1.049563152	1.000000000	14084
09	1.292628956	-0.830916200	37396
10	0.784094635	0.702529388	92093
11	0.423496803	0.328961684	207912
12	1.020404730	0.654916542	441758

gem: dabchefgkijnlmqoptrsvuywxAz
kzyedotihnagujfcxqAvslbrpwm
h0 v54 murtsbApqfykxdnhzceojwvalig

U[875] edges: 9 blocks: 1 orient: +

9_{37} (1) 1 blinks

$r_?^{48}$ #ts(partial) 222

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	4
04	0.000000000	0.000000000	136
05	1.000000000	0.800000000	524
06	1.000000000	0.333333333	3227
07	0.554958132	-0.714285714	10304
08	1.000000000	1.000000000	35952
09	0.986234685	0.705097284	94368
10	0.618033989	0.800000000	247293
11	0.092400699	-0.363636364	556468
12	1.000000000	1.000000000	1223704

gem: dabcgefjhimklpnosqrvtuxw
mxnedutgpkjrwvqsobihfcal
h0 v48 rfhjxblcewpvqmsknatodgui

U[879] edges: 9 blocks: 1 orient: +

9_{38} (0) 16^1 4 blinks

r_{14}^{28} #ts(full) 22

r	mod	theta/pi	#sts
03	1.000000000	0.250000000	4
04	1.000000000	0.625000000	136
05	0.525731112	0.950000000	524
06	0.577350269	-0.333333333	3227
07	0.736976229	0.107142857	10304
08	1.000000000	0.437500000	35952
09	0.656538502	0.750000000	94368
10	0.447213595	-0.800000000	247293
11	0.326018680	-0.113636364	556468
12	0.577350269	0.208333333	1223704

gem: dabcgefjhilknm
jlfedcmgkainhb
h0 v28 kjenmidalbhfcg

U[880] edges: 9 blocks: 1 orient: +

U[1827] edges: 9 blocks: 1 orient: -

U[1450] edges: 9 blocks: 1 orient: -

U[1537] edges: 9 blocks: 1 orient: +

9_{39} (0) 5^1 2 blinks

$r_?^{52}$ #ts(full) 32

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	0.500000000	66
05	0.939130455	0.445931659	162
06	0.288675135	1.000000000	1053
07	0.734023369	0.822077978	2430
08	0.844623199	0.750000000	8736
09	0.337737414	-0.633612558	17952
10	0.881966011	-0.891863317	47613
11	0.708637759	-0.980478973	88750
12	0.621939625	-0.889646175	194746

gem: dabchefgkijnlmporqtswuvyxAz
ktoAdlqihwarzcnupfjygxsvbme
h0 v54 igzjmcArsdxkyvunawqotphlefb

U[887] edges: 9 blocks: 1 orient: +

U[1269] edges: 9 blocks: 1 orient: +

9_{40} (0) 9^1 8 blinks

$r_?^{36}$ #ts(full) 22

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	1.000000000	66
05	0.973248989	0.800000000	162
06	0.500000000	0.500000000	1053
07	0.128706231	-0.142857143	2430
08	0.191341716	-0.500000000	8736
09	0.707106781	0.833333333	17952
10	0.947213595	0.400000000	47613
11	0.178883364	-0.481908983	88750
12	0.790569415	0.897583618	194746

gem: dabcgefjhimklpnorq
jrmedcognabqfihlpk
h0 v36 qligcodpekjbamrhnf

U[889] edges: 9 blocks: 1 orient: +

U[1201] edges: 9 blocks: 1 orient: -

U[3100] edges: 9 blocks: 1 orient: -

U[1012] edges: 9 blocks: 1 orient: +

U[1271] edges: 9 blocks: 1 orient: +

U[3227] edges: 9 blocks: 1 orient: -

U[1020] edges: 9 blocks: 1 orient: +

U[2141] edges: 9 blocks: 1 orient: -

9_{41} (0) 4 blinks

$r_?^{46}$ #ts(full) 1

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	0.000000000	66
05	0.573741760	-0.124367653	162
06	0.288675135	0.000000000	1053
07	0.504128378	-0.931443715	2430
08	0.191341716	1.000000000	8736
09	0.946489067	0.680566542	17952
10	0.329179607	0.248735306	47613
11	0.334412133	0.249822708	88750
12	0.317664149	0.479217164	194746

gem: dabchefgkijmlonrpqustwv
kqtwdmoihgrsfljnuapvbce
h0 v46 snwqjirloehkbmutdvapfgc

U[1270] edges: 9 blocks: 1 orient: +

U[1657] edges: 9 blocks: 1 orient: +

9_{42} (0) 3^1 12 blinks

$r_?^{44}$ #ts(full) 1

r	mod	theta/pi	#sts
03	0.707106781	0.500000000	2
04	0.500000000	0.750000000	66
05	0.354591908	-0.824367653	162
06	0.500000000	-0.500000000	1053
07	0.281956689	0.803767548	2430
08	0.844623199	0.125000000	8736
09	0.738992696	-0.833333333	17952
10	0.125735421	0.648735306	47613
11	0.269467614	0.786395388	88750
12	0.094734345	0.000000000	194746

gem: dabchefgkijnlmporqtsvu
ktnedcoihpqbvfgmaurlsj
h0 v44 eoufidvsphlktbnamgjqcr

U[892] edges: 9 blocks: 1 orient: +

U[1445] edges: 9 blocks: 1 orient: -

U[2201] edges: 9 blocks: 1 orient: -

U[1272] edges: 9 blocks: 1 orient: +

U[1809] edges: 9 blocks: 1 orient: -

U[2545] edges: 9 blocks: 2 orient: +

U[1369] edges: 9 blocks: 1 orient: +

U[1858] edges: 9 blocks: 1 orient: -

U[2652] edges: 9 blocks: 1 orient: +

U[2859] edges: 9 blocks: 1 orient: -

U[3062] edges: 9 blocks: 1 orient: +

U[3077] edges: 9 blocks: 1 orient: -

9_{43} (0) 5^1 10 blinks

$r_?^{44}$ #ts(full) 3

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	0.500000000	66
05	0.707106781	0.300000000	162
06	0.288675135	1.000000000	1053
07	0.905589257	0.483847254	2430
08	0.461939766	-0.250000000	8736
09	0.365519314	-0.342907430	17952
10	0.500000000	-0.600000000	47613
11	0.524806850	-0.674928659	88750
12	0.170627495	0.787433521	194746

gem: dabcgefjhimklpnorqtsvu
jvpedsmglaqihbutofrckn
h0 v44 puqmnkicrfjedlvahtbgso

U[893] edges: 9 blocks: 1 orient: +

U[1273] edges: 9 blocks: 1 orient: +

U[1006] edges: 9 blocks: 1 orient: +

U[1444] edges: 9 blocks: 1 orient: -

U[1015] edges: 9 blocks: 1 orient: +

U[1655] edges: 9 blocks: 1 orient: +

U[2202] edges: 9 blocks: 1 orient: -

U[2455] edges: 9 blocks: 1 orient: +

U[2858] edges: 9 blocks: 1 orient: -

U[3076] edges: 9 blocks: 1 orient: -

9_{44} (0) 9^1 1 blinks

$r_?^{60}$ #ts(partial) 1114

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	1.000000000	130
05	0.141995114	-0.800000000	258
06	0.500000000	-0.500000000	2445
07	0.770142225	-0.504224778	4632
08	0.574025149	-0.500000000	21016
09	0.297532977	-0.468742780	37400
10	0.020162612	-0.400000001	115525
11	0.977502510	0.882979470	193650
12	0.570930726	0.962566479	473586

gem: dabchefglijkomnqptrsvuywxAzDBC
hxDqdlkjvagfcCrotpwesAuBzyibnm
h0 v60 pwyjonDqhdBrlueaivAftmbgCkszcx

U[894] edges: 9 blocks: 1 orient: +

9_{45} (0) 3^1 5 blinks

$r_?^{40}$ #ts(full) 23

r	mod	theta/pi	#sts
03	0.707106781	0.500000000	2
04	0.500000000	-0.250000000	130
05	0.601500955	0.700000000	258
06	0.500000000	-0.500000000	2445
07	0.352334551	0.407807284	4632
08	0.461939766	0.625000000	21016
09	0.651490190	-0.854183441	37400
10	0.361803399	-0.400000000	115525
11	0.714495189	-0.433881597	193650
12	0.438163552	0.201144573	473586

gem: dabcgefjhimklpnorqts
jqkedchgmrftpsbioanl
h0 v40 fkirosdpcbjatmeqhgln

U[895] edges: 9 blocks: 1 orient: +

U[2852] edges: 9 blocks: 1 orient: -

U[988] edges: 9 blocks: 1 orient: +

U[3019] edges: 9 blocks: 1 orient: -

U[997] edges: 9 blocks: 1 orient: +

9_{46} (0) 3 blinks

$r_?^{38}$ #ts(full) 20

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	0.000000000	130
05	0.141995114	-0.600000000	258
06	0.288675135	0.000000000	2445
07	0.121955755	0.976828893	4632
08	0.349854384	1.000000000	21016
09	0.435531228	-0.804113156	37400
10	0.020162612	-0.799999999	115525
11	0.363485788	0.001737265	193650
12	0.739637029	0.000000000	473586

gem: dabcgefjhimklonqpsr
jroedcqglabspmfnhki
h0 v38 lpngcismfqjarebokhd

U[1761] edges: 9 blocks: 1 orient: +

U[3215] edges: 9 blocks: 1 orient: -

9_{47} (0) 1 blinks

$r_?^{48}$ #ts(full) 295

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	142
05	0.573741760	0.275632347	536
06	0.288675135	0.000000000	3575
07	0.171255661	-0.677157429	10988
08	0.574025149	1.000000000	40836
09	0.510865515	0.392843344	103452
10	0.329179607	-0.551264694	283977
11	0.919692736	-0.765094608	620752
12	0.184182555	-0.740727997	1412938

gem: dabcgefjhimklpnosqrvtuxw
jrpedcmgtaowhqvfnbislxuk
h0 v48 ogrwkvspdejanmlhfubxcqit

U[897] edges: 9 blocks: 1 orient: +

9_{48} (0) 1 blinks

$r_?^{46}$ #ts(partial) 122

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	78
05	0.141995114	0.600000000	344
06	0.288675135	0.000000000	1831
07	0.669569136	0.791774001	6168
08	1.115221249	1.000000000	20704
09	0.899231929	-0.826864291	55096
10	0.020162612	0.799999999	143189
11	0.444728026	0.728692629	322584
12	0.449180891	-0.696806603	709822

gem: dabcgefjhimklpnosqrutwv
jrqudwhgmafnslvtpbiceok
h0 v46 uhgfvscmonjtwkiaeldrpqb

U[899] edges: 9 blocks: 1 orient: +

9_{49} (0) 3^1 8 blinks

$r_?^{32}$ #ts(full) 5

r	mod	theta/pi	#sts
03	0.707106781	0.500000000	4
04	0.500000000	0.750000000	78
05	0.928333668	0.824367653	344
06	0.500000000	-0.500000000	1831
07	0.103214383	0.642857143	6168
08	0.461939766	-0.875000000	20704
09	0.494622939	0.753479442	55096
10	0.861803399	-0.648735306	143189
11	0.734443654	-0.339690201	322584
12	0.353553391	-0.500000000	709822

gem: dabcgefjhimklpno
jpmedlhgknofcaib
h0 v32 pofhkinmcejgdlba

U[900] edges: 9 blocks: 1 orient: +

U[1739] edges: 9 blocks: 1 orient: -

U[2841] edges: 9 blocks: 1 orient: -

U[924] edges: 9 blocks: 2 orient: -

U[2226] edges: 9 blocks: 1 orient: +

U[2973] edges: 9 blocks: 1 orient: -

U[1733] edges: 9 blocks: 1 orient: +

U[2439] edges: 9 blocks: 1 orient: +

9_{50} (0) 7^1 7 blinks

$r_?^{34}$ #ts(full) 2

r	mod	theta/pi	#sts
03	0.707106781	-0.500000000	4
04	0.500000000	0.750000000	78
05	0.229752920	-0.300000000	344
06	0.288675135	0.000000000	1831
07	0.567055611	-0.214285714	6168
08	0.574025148	-0.875000000	20704
09	0.239622258	-0.913187225	55096
10	0.052786404	-0.400000000	143189
11	0.514138059	-0.021861582	322584
12	0.734490785	-0.669842373	709822

gem: dabcgefjhimklonqp
jnkedmhgpacbqliof
h0 v34 poghbkimcfjqdaenl

U[906] edges: 9 blocks: 1 orient: +

U[1744] edges: 9 blocks: 1 orient: +

U[2945] edges: 9 blocks: 1 orient: +

U[1630] edges: 9 blocks: 2 orient: -

U[2224] edges: 9 blocks: 1 orient: -

U[1673] edges: 9 blocks: 2 orient: -

U[2500] edges: 9 blocks: 1 orient: -

9_{51} (0) 11^1 10 blinks

r_{136}^{28} #ts(full) 95

r	mod	theta/pi	#sts
03	0.707106781	-0.500000000	4
04	0.500000000	-0.750000000	78
05	0.371748034	0.500000000	344
06	0.288675135	1.000000000	1831
07	0.417906506	0.214285714	6168
08	0.461939766	-0.125000000	20704
09	0.464242827	-0.833333333	55096
10	0.138196601	0.000000000	143189
11	0.000000000	0.000000000	322584
12	0.105662433	0.750000000	709822

gem: dabcgefjhilknm
jlfedcmgkainhb
h0 v28 hjknmldafbeicg

U[908] edges: 9 blocks: 1 orient: +

U[1471] edges: 9 blocks: 1 orient: -

U[1751] edges: 9 blocks: 1 orient: -

U[1049] edges: 9 blocks: 2 orient: +

U[1477] edges: 9 blocks: 4 orient: +

U[2431] edges: 9 blocks: 1 orient: +

U[1052] edges: 9 blocks: 2 orient: -

U[1485] edges: 9 blocks: 4 orient: +

U[2947] edges: 9 blocks: 1 orient: -

9_{52} (1) 5^1 1 blinks

$r_?^{52}$ #ts(partial) 862

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	4
04	0.000000000	0.000000000	166
05	1.000000000	0.200000000	584
06	1.000000000	1.000000000	4487
07	1.965435489	0.540105328	12764
08	1.000000000	0.250000000	52212
09	2.208933055	0.239347160	124428
10	1.618033989	-0.200000000	364953
11	0.983751158	0.902954683	761728
12	0.517638090	0.250000000	1818514

gem: dabchefgkijmlpnosqrutxvwzy
kmvedqsphlajbytwfczxruiong
h0 v52 qxwirkmtzcvnulfapyhsgojbed

9_{53} (1) 5^1 11 blinks

$r_?^{34}$ #ts(full) 9

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	4
04	1.000000000	-0.500000000	166
05	1.000000000	-0.800000000	584
06	1.000000000	0.666666667	4487
07	1.414213562	0.472169585	12764
08	1.000000000	0.250000000	52212
09	1.331660018	-0.250652838	124428
10	1.618033989	-0.600000000	364953
11	1.899806432	0.869772590	761728
12	2.503587265	0.517041874	1818514

gem: dabcgefjhimklonqp
joledchgpaiqnmbkf
h0 v34 nqilomjfcbedhpkag

U[911] edges: 9 blocks: 1 orient: +

U[1965] edges: 9 blocks: 1 orient: +

U[2462] edges: 9 blocks: 1 orient: +

U[1121] edges: 9 blocks: 1 orient: +

U[1966] edges: 9 blocks: 1 orient: +

U[2647] edges: 9 blocks: 1 orient: -

U[1240] edges: 9 blocks: 1 orient: -

U[2196] edges: 9 blocks: 1 orient: -

U[2686] edges: 9 blocks: 1 orient: -

U[2689] edges: 9 blocks: 1 orient: -

U[2704] edges: 9 blocks: 1 orient: -

9_{54} (0) 5^1 4 blinks

$r_?^{58}$ #ts(full) 8493

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	0.500000000	66
05	0.674473890	0.175632347	138
06	0.288675135	1.000000000	885
07	0.497935824	0.132138119	1902
08	0.079256334	-0.250000000	6528
09	0.586568617	-0.079125430	13248
10	0.454915028	-0.351264694	33453
11	0.782450151	-0.343606275	62710
12	0.166209766	-0.569295384	132250

gem: dabcgefkhijnlmqopsrutwvyxBzADC
gwmAditqfzlkyvnrupashobjDxeCBc
h0 v60 qnzxvcBgAmoaCswDlibdyuktefrhjp

U[912] edges: 9 blocks: 1 orient: +

U[1861] edges: 9 blocks: 1 orient: +

U[1021] edges: 9 blocks: 1 orient: +

U[1800] edges: 9 blocks: 1 orient: +

9_{55} (0) 9 blinks

$r_?^{48}$ #ts(full) 43

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	1.000000000	66
05	0.798872081	0.745931659	138
06	0.288675135	0.000000000	885
07	0.517584392	-0.256786059	1902
08	0.574025149	-0.500000000	6528
09	0.366373277	-0.865139473	13248
10	0.638196601	0.508136683	33453
11	0.444334647	-0.393725595	62710
12	0.460571866	0.869926531	132250

gem: dabcgefkhijnlmqopsrutwvyx
nqxedctgpsvkramiuowhyljfb
h0 v50 pgvtsubqnrohdekylximwcfja

U[913] edges: 9 blocks: 1 orient: +

U[1723] edges: 9 blocks: 1 orient: +

U[1862] edges: 9 blocks: 1 orient: +

U[1023] edges: 9 blocks: 1 orient: +

U[1759] edges: 9 blocks: 1 orient: +

U[2846] edges: 9 blocks: 1 orient: -

U[1370] edges: 9 blocks: 1 orient: -

U[1801] edges: 9 blocks: 1 orient: +

U[3216] edges: 9 blocks: 1 orient: -

9_{56} (0) 7 blinks

$r_?^{44}$ #ts(full) 1

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	0.000000000	66
05	0.634136124	0.042016670	138
06	0.288675135	0.000000000	885
07	0.681028584	0.226728785	1902
08	0.032829048	0.000000000	6528
09	0.258147329	-0.285276208	13248
10	0.402128624	-0.084033340	33453
11	0.505308730	-0.031628274	62710
12	0.714437206	-0.082458534	132250

gem: dabcgefjhimklpnosqrvtu
munedcsgrkjivfbqpthloa
h0 v44 rvegcilnfupdhmtsoakqjb

U[914] edges: 9 blocks: 1 orient: +

U[1687] edges: 9 blocks: 1 orient: -

U[3320] edges: 9 blocks: 2 orient: -

U[1024] edges: 9 blocks: 1 orient: +

U[1803] edges: 9 blocks: 1 orient: +

U[1592] edges: 9 blocks: 1 orient: -

U[1863] edges: 9 blocks: 1 orient: +

9_{57} (0) 3^1 14 blinks

$r_?^{44}$ #ts(full) 2

r	mod	theta/pi	#sts
03	0.707106781	0.500000000	2
04	0.500000000	0.750000000	66
05	0.791034400	-0.810914604	138
06	0.500000000	-0.500000000	885
07	0.390490928	0.492769108	1902
08	0.303427098	0.125000000	6528
09	0.439688074	-0.476103888	13248
10	0.625735421	0.621829208	33453
11	0.393664085	-0.955615006	62710
12	0.178138318	-0.127285205	132250

gem: dabcgefjhimklpnorqtsvu
jprudqsgtminalfbovhkec
h0 v44 njustirmfbapqkdghlovce

U[2274] edges: 9 blocks: 1 orient: +

U[3123] edges: 9 blocks: 1 orient: +

U[2293] edges: 9 blocks: 1 orient: -

U[3224] edges: 9 blocks: 1 orient: -

U[3096] edges: 9 blocks: 1 orient: -

U[1029] edges: 9 blocks: 1 orient: +

U[1035] edges: 9 blocks: 1 orient: -

U[2137] edges: 9 blocks: 1 orient: +

U[1198] edges: 9 blocks: 1 orient: -

U[1804] edges: 9 blocks: 1 orient: +

U[2139] edges: 9 blocks: 1 orient: -

U[2183] edges: 9 blocks: 1 orient: -

9_{58} (0) 14 blinks

$r_?^{42}$ #ts(full) 8

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	42
05	0.573741760	0.675632347	172
06	0.288675135	0.000000000	707
07	0.291536873	0.236624273	2384
08	0.349854384	1.000000000	7084
09	0.295848406	0.798397462	19016
10	0.329179607	0.648735306	46357
11	0.753934327	0.552899243	105252
12	0.975583658	0.105337606	222942

gem: dabcgefjhimklpnosqrut
jtpedorglabuqmscnhfki
h0 v42 rloshaumtpjbeiqkcfdng

U[918] edges: 9 blocks: 2 orient: +

U[1040] edges: 9 blocks: 2 orient: +

U[1473] edges: 9 blocks: 1 orient: +

U[1732] edges: 9 blocks: 1 orient: +

U[2001] edges: 9 blocks: 2 orient: +

U[2435] edges: 9 blocks: 1 orient: +

U[2840] edges: 9 blocks: 1 orient: -

U[1757] edges: 9 blocks: 1 orient: +

U[2222] edges: 9 blocks: 1 orient: +

U[2499] edges: 9 blocks: 1 orient: +

U[2972] edges: 9 blocks: 1 orient: -

U[1812] edges: 9 blocks: 2 orient: +

U[2434] edges: 9 blocks: 1 orient: +

U[2760] edges: 9 blocks: 1 orient: -

9_{59} (0) 6 blinks

$r_?^{44}$ #ts(full) 48

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	42
05	0.459505841	1.000000000	172
06	0.288675135	0.000000000	707
07	0.378843032	0.224997062	2384
08	0.956708581	0.000000000	7084
09	0.656510688	-0.004687008	19016
10	0.211145618	0.000000000	46357
11	0.692408446	0.194748587	105252
12	1.261169117	-0.058903537	222942

gem: dabchefgkijnlmqoptrsvu
kurndmoihsapfetlcqvgbj
h0 v44 msgfjpcbqerktunvilhaod

U[919] edges: 9 blocks: 2 orient: +

U[2091] edges: 9 blocks: 2 orient: +

U[1539] edges: 9 blocks: 1 orient: +

U[3078] edges: 9 blocks: 2 orient: +

U[1814] edges: 9 blocks: 2 orient: +

U[3087] edges: 9 blocks: 1 orient: +

9_{60} (0) 3^1 5 blinks

$r_?^{34}$ #ts(full) 1

r	mod	theta/pi	#sts
03	0.707106781	-0.500000000	4
04	0.500000000	-0.750000000	42
05	0.229752920	0.300000000	172
06	0.500000000	0.500000000	707
07	0.856255886	0.071428571	2384
08	0.844623199	-0.125000000	7084
09	0.385990751	-0.798094937	19016
10	0.052786404	0.400000000	46357
11	0.597252044	0.637205563	105252
12	0.713424555	0.542393001	222942

gem: dabcgefjhimklonqp
jkmednqglabipfcoh
h0 v34 oeihpanmcqjgdlfbk

U[931] edges: 9 blocks: 2 orient: +

U[2971] edges: 9 blocks: 1 orient: +

U[1819] edges: 9 blocks: 2 orient: -

U[3021] edges: 9 blocks: 4 orient: +

U[2223] edges: 9 blocks: 1 orient: -

9_{61} (0) 4^1 2 blinks

$r_?^{46}$ #ts(full) 765

r	mod	theta/pi	#sts
03	1.000000000	-0.250000000	4
04	0.707106781	-0.875000000	86
05	0.896803907	0.892016670	312
06	1.154700538	0.000000000	1835
07	1.782580060	-0.445158038	5428
08	0.358719468	-0.991586724	19164
09	1.262772155	0.660342975	47364
10	1.051757545	0.507543351	126669
11	1.345342253	0.677680432	272624
12	1.418437918	-0.100427573	611266

gem: dabcgefjhimklpnosqrutwv
jtsedrwgkpivnmuablcqofh
h0 v46 rkjtvscbmghqoewlpaudfni

9_{62} (0) 4^1 7 blinks

$r_?^{44}$ #ts(full) 2260

r	mod	theta/pi	#sts
03	1.000000000	-0.250000000	4
04	0.707106781	0.625000000	86
05	1.192598523	0.333429989	312
06	0.577350269	0.333333333	1835
07	0.492496878	0.648189679	5428
08	1.398966326	0.893826703	19164
09	2.496884736	0.571918172	47364
10	1.056273368	-0.174128585	126669
11	2.585093523	-0.987574706	272624
12	1.763531213	0.605916951	611266

gem: dabcgefjhimklpnorqtsvu
jinvdlsgrapfumqtobhkce
h0 v44 lohrkpvcsejgqitumdnbfa

U[946] edges: 9 blocks: 1 orient: +

U[2169] edges: 9 blocks: 1 orient: -

U[3135] edges: 9 blocks: 2 orient: +

U[1872] edges: 9 blocks: 2 orient: +

U[2927] edges: 9 blocks: 2 orient: +

U[1913] edges: 9 blocks: 1 orient: +

U[2953] edges: 9 blocks: 1 orient: -

9_{63} (0) 5^1 2 blinks

$r_?^{56}$ #ts(full) 1948

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	-0.500000000	66
05	0.513743148	1.000000000	134
06	0.288675135	1.000000000	869
07	0.393735277	-0.888787692	1790
08	0.237769002	-0.750000000	6148
09	0.183399866	0.620497705	12196
10	0.263932023	0.000000000	30509
11	0.302138842	0.038712995	56702
12	0.451437919	-0.014619047	118150

gem: dabchefgkijnlmqoptrswuvyxAzCB
kzqedvuihAabgCnBtpmysfxwcljro
h0 v58 iBgyrzcbtwlkqejvmnhCdAofuxpsa

U[952] edges: 9 blocks: 1 orient: +

U[1333] edges: 9 blocks: 1 orient: +

9_{64} (0) 2 blinks

$r_?^{50}$ #ts(full) 12

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	1.000000000	66
05	0.721222998	0.563081267	134
06	0.288675135	0.000000000	869
07	0.777403185	0.980932741	1790
08	0.891050484	0.500000000	6148
09	0.281589573	-0.059477264	12196
10	0.520162612	0.873837466	30509
11	0.491142495	-0.726355579	56702
12	0.363317251	0.879784567	118150

gem: dabcgefjhimklpnosqrvtuxwzy
mpuedtxgqkjyalzvowfscbrhni
h0 v52 xsemphuzbrcotglkwyidnqvajf

U[954] edges: 9 blocks: 1 orient: +

U[1334] edges: 9 blocks: 1 orient: +

9_{65} (0) 1 blinks

$r_?^{48}$ #ts(full) 3

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	78
05	0.305141982	-0.254068341	288
06	0.288675135	0.000000000	1563
07	0.213337107	-0.649644950	4692
08	0.508367052	1.000000000	15740
09	0.268675617	0.779968922	39396
10	0.093111629	0.508136683	101821
11	0.381745213	-0.308643609	221496
12	0.979362207	-0.209103532	484842

gem: dabchefgkijnlmqoptrsvuxw
kqwedupihlajgonmsxbftcvr
h0 v48 ugfjpkbamwcoxetnvqdlhrsi

U[970] edges: 9 blocks: 1 orient: +

9_{66} (0) 4^1 12 blinks

$r_?^{36}$ #ts(full) 17

r	mod	theta/pi	#sts
03	1.000000000	0.250000000	4
04	0.707106781	0.375000000	78
05	0.525731112	-0.450000000	288
06	0.577350269	-0.333333333	1563
07	1.269769848	-0.471351985	4692
08	1.778823646	-0.471805834	15740
09	1.755514542	-0.254318675	39396
10	0.170820393	0.200000000	101821
11	1.331308712	0.873858951	221496
12	1.949523342	-0.933047903	484842

gem: dabcgefjhimklpnorq
jrnedclgkaphfmqiob
h0 v36 okiqnrmfcbjageldph

U[972] edges: 9 blocks: 1 orient: +

U[1426] edges: 9 blocks: 1 orient: +

U[1795] edges: 9 blocks: 1 orient: +

U[2024] edges: 9 blocks: 2 orient: +

U[1058] edges: 9 blocks: 2 orient: +

U[1582] edges: 9 blocks: 1 orient: +

U[1832] edges: 9 blocks: 1 orient: -

U[2244] edges: 9 blocks: 1 orient: +

U[1115] edges: 9 blocks: 1 orient: +

U[1584] edges: 9 blocks: 1 orient: -

U[1959] edges: 9 blocks: 1 orient: +

U[2386] edges: 9 blocks: 1 orient: -

9_{67} (1) 3^1 1 blinks

$r_?^{48}$ #ts(partial) 12

r	mod	theta/pi	#sts
03	1.000000000	-0.500000000	4
04	0.000000000	0.000000000	102
05	0.726542528	-0.800000000	360
06	1.000000000	0.333333333	2331
07	1.959889384	-0.746508443	6732
08	1.732050808	0.320913276	25196
09	1.095144032	-0.300331087	61068
10	0.145898034	0.600000000	169693
11	1.194780176	0.842256451	359568
12	1.239313675	-0.048855427	828018

gem: dabchefgkijnlmqoptrsvuxw
hwmsdpoanxgktvlfrqecbiuj
h0 v48 nigqvocbhamsxjfudkwptelr

9_{68} (1) 3^1 3 blinks

$r_?^{50}$ #ts(full) 3771

r	mod	theta/pi	#sts
03	1.000000000	0.500000000	4
04	0.000000000	0.000000000	54
05	0.726542528	0.600000000	228
06	1.000000000	-0.333333333	1067
07	1.171509839	0.832582638	3568
08	1.473625758	-0.215694166	11196
09	2.324376515	0.493069542	29736
10	0.313529205	0.945931659	74373
11	2.728350557	-0.985411676	167948
12	2.017869364	-0.292393001	359906

gem: eabcdifghkjnlmqoptrsvuxwzy
kwqtvesxyiabgonrcpmudflzjh
h0 v52 morhztndwfqkuysavxbjplicge

U[976] edges: 9 blocks: 1 orient: +

U[2276] edges: 9 blocks: 1 orient: +

U[2285] edges: 9 blocks: 1 orient: +

9_{69} (1) 3 blinks

$r_?^{46}$ #ts(full) 48

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	4
04	0.000000000	0.000000000	54
05	0.381966011	-0.800000000	228
06	1.000000000	0.333333333	1067
07	1.847588408	-0.048257464	3568
08	0.414213562	-0.250000000	11196
09	0.820639567	-0.869248175	29736
10	1.121318070	0.824367653	74373
11	1.265401156	-0.538655709	167948
12	1.239313675	-0.798855427	359906

gem: dabchefglijkomnqpsrutwv
hplsdtjmbnfwqgioavekruc
h0 v46 tfnkvbrihqdmlcwgupasjeo

U[979] edges: 9 blocks: 1 orient: +

U[2277] edges: 9 blocks: 1 orient: +

U[3406] edges: 9 blocks: 2 orient: +

9_{70} (0) 4^1 1 blinks

$r_?^{42}$ #ts(partial) 208

r	mod	theta/pi	#sts
03	1.000000000	0.250000000	4
04	0.707106781	0.875000000	136
05	0.525731112	-0.850000000	524
06	0.577350269	-0.333333333	3227
07	0.498276301	0.342192716	10304
08	1.118033989	0.335083618	35952
09	0.336039451	0.125859861	94368
10	0.170820393	0.200000000	247293
11	0.614407526	0.098696948	556468
12	0.614810159	0.429978281	1223704

gem: dabcgefjhimklpnosqrut
jruedclgksihtmbqpoanf
h0 v42 nhlrcosmpujebaqtfdgik

U[983] edges: 9 blocks: 1 orient: +

9_{71} (0) 16^1 1 blinks

$r_?^{32}$ #ts(full) 11

r	mod	theta/pi	#sts
03	1.000000000	-0.250000000	4
04	1.000000000	-0.625000000	136
05	0.811393378	0.774367653	524
06	0.577350269	0.333333333	3227
07	0.291934361	-0.305660830	10304
08	0.414213562	0.562500000	35952
09	0.508457618	0.091942859	94368
10	0.588130966	-0.489085396	247293
11	0.484496544	0.828752499	556468
12	0.370379414	0.340522094	1223704

gem: dabcgefjhilknmpo
gnpedolfbmjakihc
h0 v32 mgkpaibdlnofejch

U[985] edges: 9 blocks: 1 orient: +

9_{72} (0) 3 blinks

$r_?^{52}$ #ts(full) 10302

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	0.000000000	66
05	0.141995114	1.000000000	162
06	0.288675135	0.000000000	1053
07	0.728251544	-0.442547766	2430
08	0.574025149	1.000000000	8736
09	0.527780085	-0.763604515	17952
10	0.020162612	0.000000000	47613
11	0.266464014	0.285687685	88750
12	0.409753352	-0.191632690	194746

gem: dabchefgkijnlmqopsrutwvyxAz
kvxedcoAhznjgsmywqapburftli
h0 v54 gwjtzkaqnmvxcidAhyoslfbuerp

U[986] edges: 9 blocks: 1 orient: +

U[996] edges: 9 blocks: 1 orient: +

U[1908] edges: 9 blocks: 1 orient: +

9_{73} (0) 3^1 6 blinks

$r_?^{50}$ #ts(full) 7700

r	mod	theta/pi	#sts
03	0.707106781	0.500000000	2
04	0.500000000	0.750000000	66
05	0.493730098	-0.754068341	162
06	0.500000000	-0.500000000	1053
07	0.706263829	0.891325286	2430
08	0.620452434	0.125000000	8736
09	0.290357555	0.786414606	17952
10	0.243769410	0.508136683	47613
11	0.286692410	0.790456024	88750
12	0.658526422	-0.419842373	194746

gem: dabchefgkijnlmposqrutxvwzy
kywedvqihuaptxnbgfmszrcolj
h0 v52 gsimryolnbhkdcaupxjvqtfzwe

U[989] edges: 9 blocks: 1 orient: +

U[999] edges: 9 blocks: 1 orient: +

U[1518] edges: 9 blocks: 1 orient: +

U[1530] edges: 9 blocks: 1 orient: +

U[1909] edges: 9 blocks: 1 orient: +

U[2558] edges: 9 blocks: 1 orient: +

9_{74} (0) 5^1 6 blinks

$r_?^{44}$ #ts(full) 622

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	-0.500000000	66
05	0.513743148	-0.600000000	162
06	0.288675135	1.000000000	1053
07	0.154984888	-0.755332536	2430
08	0.620452434	0.250000000	8736
09	0.846228777	0.575941748	17952
10	0.263932022	-0.800000000	47613
11	0.481646681	0.271917219	88750
12	0.313263088	0.550033911	194746

gem: dabcgefjhimklpnorqtsvu
gthpdoamsqjnclrekvubif
h0 v44 pofqscvgnmidtkualerjbh

9_{75} (0) 9^1 10 blinks

$r_?^{40}$ #ts(full) 2

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	1.000000000	66
05	0.721222998	0.763081267	162
06	0.500000000	0.500000000	1053
07	0.199373487	0.117312249	2430
08	0.574025149	-0.500000000	8736
09	0.277627123	0.888888889	17952
10	0.520162612	0.473837466	47613
11	0.237153888	-0.942838754	88750
12	0.250643519	0.977185526	194746

gem: dabchefgkijnlmporqts
hmtidkoaecqrbgnfpslj
h0 v40 jqfsncpihrlkdtbgoame

9_{76} (0) 4 blinks

$r_?^{56}$ #ts(full) 1687

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	0.000000000	66
05	0.634136124	-0.357983330	146
06	0.288675135	0.000000000	929
07	0.833734007	-0.334482093	2090
08	0.349854384	0.000000000	7264
09	1.134970781	-0.914623572	14944
10	0.402128624	0.715966660	38465
11	1.063898189	0.671799094	72218
12	0.578143592	-0.054260454	154978

gem: dabchefglijkomnqpsrutwvzxyCABED
lvfedcEqhCnuDszoAwkramtjBpiyxbg
h0 v62 DgswvxpaoytmlAibfqCBeuErjnzkchd

9_{77} (0) 3^1 7 blinks

$r_?^{46}$ #ts(full) 1

r	mod	theta/pi	#sts
03	0.707106781	-0.500000000	2
04	0.500000000	0.250000000	66
05	0.903724752	-0.481821649	146
06	0.500000000	0.500000000	929
07	0.664068833	-0.691277271	2090
08	0.686110531	0.375000000	7264
09	0.362066194	-0.898703477	14944
10	0.816718427	-0.036356703	38465
11	1.464474720	0.897602174	72218
12	0.556148717	-0.154081387	154978

gem: dabchefgkijnlmposqrutwv
kspedumihqabvontjgwcfrl
h0 v46 mgrwjtbanplkhdvuocfseqi

9_{78} (0) 5^1 10 blinks

$r_?^{44}$ #ts(full) 17062

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	-0.500000000	66
05	0.939130455	-0.554068341	146
06	0.288675135	1.000000000	929
07	1.232937734	-0.851997182	2090
08	0.844623199	-0.750000000	7264
09	0.436115768	0.866870237	14944
10	0.881966011	-0.891863317	38465
11	0.267305715	0.015043742	72218
12	0.394337567	0.500000000	154978

gem: dabcgefjhimklpnorqtsvu
jsvkdrhgfaecumbqptoinl
h0 v44 ftqpvaomeujgrcldnshbki

9_{79} (0) 3^1 2 blinks

$r_?^{46}$ #ts(full) 353

r	mod	theta/pi	#sts
03	0.707106781	0.500000000	4
04	0.500000000	-0.750000000	42
05	0.862420669	-0.730853420	172
06	0.500000000	0.500000000	703
07	0.348247882	0.316096036	2404
08	0.079256334	0.875000000	7080
09	0.315137246	-0.905127529	19088
10	0.743769410	0.461706841	46437
11	0.978111216	-0.177415037	105500
12	0.601548235	-0.858423697	223282

gem: dabchefgkijmlpnorqtsvuxw
hmuedvrwxgtkofbspjqlcnai
h0 v48 gfqjurathswpcmexnbdiokvl

U[2003] edges: 9 blocks: 2 orient: +

9_{80} (0) 3^1 8 blinks

$r_?^{34}$ #ts(full) 7

r	mod	theta/pi	#sts
03	0.707106781	-0.500000000	4
04	0.500000000	-0.750000000	42
05	0.229752921	-0.500000000	172
06	0.500000000	0.500000000	703
07	0.417906506	-0.642857143	2404
08	0.461939766	0.875000000	7080
09	0.664918998	0.011788960	19088
10	0.052786405	0.000000000	46437
11	0.641310831	-0.759897678	105500
12	0.790569415	0.852416382	223282

gem: dabcgefjhimklonqp
jomedlpgknbqcaihf
h0 v34 lfhnibqoekjpdmcag

U[1051] edges: 9 blocks: 2 orient: +

U[2005] edges: 9 blocks: 2 orient: +

U[2943] edges: 9 blocks: 1 orient: -

U[1510] edges: 9 blocks: 3 orient: +

U[2496] edges: 9 blocks: 1 orient: +

U[3221] edges: 9 blocks: 2 orient: -

U[1634] edges: 9 blocks: 2 orient: +

U[2757] edges: 9 blocks: 1 orient: -

9_{81} (0) 3^1 1 blinks

$r_?^{38}$ #ts(full) 67

r	mod	theta/pi	#sts
03	0.707106781	0.500000000	4
04	0.500000000	0.750000000	42
05	0.601500955	0.700000000	148
06	0.500000000	-0.500000000	597
07	0.226177023	-0.277730307	1664
08	0.079256334	0.125000000	4616
09	0.847093786	-0.546302725	10720
10	0.361803399	-0.400000000	24125
11	0.171626081	-0.089640594	48980
12	0.275611854	-0.888311615	96186

gem: dabcgefjhimklonqpsr
jsopdnlgrabhfmqecik
h0 v38 nhescbmfaqjpgirokld

U[1055] edges: 9 blocks: 3 orient: +

9_{82} (0) 11^1 4 blinks

$r_?^{34}$ #ts(full) 1231

r	mod	theta/pi	#sts
03	0.707106781	0.500000000	4
04	0.500000000	0.750000000	42
05	0.973248989	0.900000000	148
06	0.288675135	1.000000000	597
07	0.615744528	0.905400322	1664
08	0.844623199	-0.875000000	4616
09	0.618213611	0.972875060	10720
10	0.947213595	-0.800000000	24125
11	0.707106781	-0.681818182	48980
12	0.809630852	-0.822579519	96186

gem: dabcgefjhimklonqp
jmpedqhgkaifolbcn
h0 v34 mhepqbjfalngikdoc

U[1056] edges: 9 blocks: 3 orient: +

U[1681] edges: 9 blocks: 2 orient: -

U[1191] edges: 9 blocks: 3 orient: -

U[1479] edges: 9 blocks: 4 orient: +

9_{83} (0) 10^1 2 blinks

$r_?^{38}$ #ts(full) 566

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	0.382683432	0.500000000	42
05	0.000000000	0.000000000	176
06	0.912870929	-0.397583618	705
07	0.000000000	0.000000000	2184
08	0.398298698	0.506423364	6124
09	0.000000000	0.000000000	15028
10	0.877596277	-0.807044656	34213
11	0.000000000	0.000000000	71688
12	0.575225494	0.444916998	142038

gem: dabcgefjhimklonqpsr
jisedrqgmapobkfnhlc
h0 v38 sfphibkoqgjarmdcenl

U[1059] edges: 9 blocks: 2 orient: +

U[3031] edges: 9 blocks: 4 orient: +

9_{84} (0) 9^1 1 blinks

$r_?^{44}$ #ts(full) 369

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	0.000000000	66
05	0.573741760	0.075632347	130
06	0.500000000	-0.500000000	859
07	0.327985278	0.186455300	1588
08	0.191341716	0.000000000	5684
09	0.707106781	-0.388888889	9780
10	0.329179607	-0.151264694	25405
11	0.594569156	-0.252330597	41030
12	0.438163552	0.048855427	87686

gem: dabcgefjhimklpnorqtsvu
jsledchgkapfumqitvronb
h0 v44 tniuavmfcrjqobglpkdesh

U[1067] edges: 9 blocks: 2 orient: +

9_{85} (0) 4^1 15 blinks

$r_?^{40}$ #ts(full) 4

r	mod	theta/pi	#sts
03	1.000000000	0.250000000	4
04	0.707106781	-0.125000000	46
05	0.811393378	0.074367653	160
06	0.577350269	-0.333333333	693
07	1.457908291	-0.035714286	1916
08	0.358719468	0.491586724	5560
09	1.221348368	-0.539344043	12820
10	0.331406180	-0.763081267	29725
11	1.606078481	-0.813924541	59960
12	0.314539887	-0.400716204	120222

gem: dabcgefjhimklpnorqts
jmptdohgnrqiblfskace
h0 v40 nekolarmqcjbsfdipthg

9_{86} (0) 4^1 3 blinks

$r_?^{38}$ #ts(full) 35

r	mod	theta/pi	#sts
03	1.000000000	-0.250000000	4
04	0.707106781	0.125000000	46
05	1.019963345	-0.186918733	160
06	1.154700538	0.000000000	693
07	1.947904916	-0.426523843	1916
08	0.207106781	-0.687500000	5560
09	1.665755046	-0.559213935	12820
10	0.798557513	-0.950328337	29725
11	1.862612149	-0.859312365	59960
12	1.656507451	0.639868820	120222

gem: dabcgefjhimklonqpsr
jiledorgmasnbcqkfhp
h0 v38 lpsnrakocgjfdmhbeqi

9_{87} (1) 5^1 1 blinks

$r_?^{44}$ #ts(partial) 790

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	4
04	0.000000000	0.000000000	72
05	1.543361918	-0.875632347	268
06	1.000000000	1.000000000	1257
07	1.000000000	0.714285714	3704
08	1.000000000	0.750000000	10976
09	1.211573817	-0.302076113	26440
10	2.127877827	-0.110914604	61625
11	1.665994406	0.054088586	128060
12	0.517638090	-0.750000000	256776

gem: dabcgefjhimklpnorqtsvu
jonmdltgsaurevbipfqhkc
h0 v44 ehosrkupvfjdtmcbgalnqi

9_{88} (0) 4^1 1 blinks

$r_?^{42}$ #ts(partial) 542

r	mod	theta/pi	#sts
03	1.000000000	-0.250000000	4
04	0.707106781	-0.875000000	72
05	0.200811416	0.250000000	268
06	0.577350269	0.333333333	1257
07	2.177668129	0.152604097	3704
08	2.040640478	-0.300134068	10976
09	1.215221030	-0.801953628	26440
10	0.211145618	0.000000000	61625
11	1.105043111	0.302985866	128060
12	2.973565729	0.003730259	256776

gem: dabcgefjhimklpnosqrut
mrnedchgpujtsfqlobaik
h0 v42 rfikljqecbphnmtduaosg

9_{89} (0) 4^1 3 blinks

$r_?^{48}$ #ts(full) 2084

r	mod	theta/pi	#sts
03	1.000000000	0.250000000	4
04	0.707106781	-0.125000000	42
05	1.019963345	-0.286918733	160
06	1.154700538	0.000000000	637
07	0.949910978	0.762083364	1904
08	0.305197887	-0.903194166	5284
09	0.409624152	-0.702529913	12772
10	0.776693149	0.073228221	28881
11	1.679422705	0.873598777	60016
12	1.858454666	-0.959632680	118422

gem: dabcgefjhimklpnosqrvtuxw
jvumdlxgwstoeifqpkarcbnh
h0 v48 tshobrlpgkjiumdcwvexnfqa

9_{90} (1) 14 blinks

$r_?^{44}$ #ts(full) 15

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	4
04	1.000000000	1.000000000	42
05	1.543361918	0.675632347	160
06	1.000000000	0.000000000	637
07	0.525851296	-0.691114607	1904
08	1.828427125	0.500000000	5284
09	1.383719197	0.358533115	12772
10	1.433781047	0.769146580	28881
11	1.550796801	0.781676072	60016
12	1.134542674	0.843406748	118422

gem: dabcgefjhimklpnorqtsvu
jkoedcqgvapismfbhnrutl
h0 v44 vfsnirampujdhlteobcqkg

U[2684] edges: 9 blocks: 1 orient: -

U[3080] edges: 9 blocks: 2 orient: -

U[2712] edges: 9 blocks: 1 orient: -

9_{91} (0) 6 blinks

$r_?^{56}$ #ts(full) 12

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	0.000000000	34
05	0.558532613	0.181821649	74
06	0.288675135	0.000000000	335
07	0.470855342	0.619640598	722
08	0.125683619	1.000000000	2020
09	1.019651931	-0.877580883	3940
10	0.311958680	-0.363643297	8689
11	0.450055422	-0.299077967	15446
12	0.202757766	0.160711506	29406

gem: dabchefgkijnlmqoptrswuvyxBzADC
knmvdBqihlyxpbAwgoCutecjasDfzr
h0 v60 CuBrpotzqvDkdfneymcAhjxwibgsal

U[2138] edges: 9 blocks: 1 orient: +

U[2181] edges: 9 blocks: 1 orient: +

U[2292] edges: 9 blocks: 1 orient: +

U[3095] edges: 9 blocks: 1 orient: +

U[3223] edges: 9 blocks: 1 orient: +

9_{92} (0) 19 blinks

$r_?^{50}$ #ts(full) 2

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	1.000000000	34
05	0.885491183	0.951264694	74
06	0.288675135	0.000000000	335
07	0.533652450	-0.245116252	722
08	0.191341716	0.500000000	2020
09	0.819766232	0.290764673	3940
10	0.784094635	0.097470612	8689
11	0.801810620	-0.640239720	15446
12	0.648594295	0.883535487	29406

gem: dabchefgkijmlpnosqrvtuxwzy
knsrdvmyhlaozbjupxcwqfteig
h0 v52 osmpuqnjbhgkclxdwyvrzifate

U[1200] edges: 9 blocks: 1 orient: +

U[1672] edges: 9 blocks: 1 orient: -

U[1475] edges: 9 blocks: 1 orient: -

U[2124] edges: 9 blocks: 1 orient: +

U[1620] edges: 9 blocks: 1 orient: -

U[2140] edges: 9 blocks: 1 orient: +

U[2185] edges: 9 blocks: 1 orient: +

U[2294] edges: 9 blocks: 1 orient: +

U[2850] edges: 9 blocks: 1 orient: -

U[3117] edges: 9 blocks: 1 orient: -

U[3225] edges: 9 blocks: 1 orient: +

U[2271] edges: 9 blocks: 1 orient: -

U[2753] edges: 9 blocks: 1 orient: +

U[3015] edges: 9 blocks: 1 orient: -

U[3119] edges: 9 blocks: 1 orient: -

U[2272] edges: 9 blocks: 1 orient: -

U[2792] edges: 9 blocks: 1 orient: -

U[3098] edges: 9 blocks: 1 orient: +

U[3120] edges: 9 blocks: 1 orient: -

9_{93} (0) 3^1 20 blinks

$r_?^{50}$ #ts(full) 16

r	mod	theta/pi	#sts
03	0.707106781	-0.500000000	2
04	0.500000000	-0.750000000	34
05	0.445740326	0.136918733	74
06	0.500000000	0.500000000	335
07	0.092518130	0.816278002	722
08	0.079256334	0.875000000	2020
09	0.631953261	-0.434513779	3940
10	0.198684438	0.726162534	8689
11	0.150028299	-0.724062609	15446
12	0.616286842	0.535895232	29406

gem: dabcgefjhimklpnosqrvtuxwzy
jzpwdslgkybhnmruxvfqcoetai
h0 v52 lnfyscbmrojatgkqpixhdwvzue

U[1203] edges: 9 blocks: 1 orient: +

U[1666] edges: 9 blocks: 1 orient: -

U[2150] edges: 9 blocks: 1 orient: +

U[1443] edges: 9 blocks: 1 orient: -

U[2120] edges: 9 blocks: 1 orient: +

U[2186] edges: 9 blocks: 1 orient: +

U[1617] edges: 9 blocks: 1 orient: -

U[2142] edges: 9 blocks: 1 orient: +

U[2200] edges: 9 blocks: 1 orient: -

U[2252] edges: 9 blocks: 1 orient: +

U[2790] edges: 9 blocks: 1 orient: -

U[2905] edges: 9 blocks: 2 orient: -

U[3107] edges: 9 blocks: 1 orient: +

U[2295] edges: 9 blocks: 1 orient: +

U[2832] edges: 9 blocks: 1 orient: -

U[3075] edges: 9 blocks: 1 orient: -

U[3226] edges: 9 blocks: 1 orient: +

U[2635] edges: 9 blocks: 2 orient: -

U[2857] edges: 9 blocks: 1 orient: -

U[3101] edges: 9 blocks: 1 orient: +

9_{94} (0) 3^1 3 blinks

$r_?^{54}$ #ts(full) 7889

r	mod	theta/pi	#sts
03	0.707106781	-0.500000000	2
04	0.500000000	0.250000000	34
05	0.521184665	0.983429989	70
06	0.500000000	0.500000000	319
07	0.642089719	-0.878480267	658
08	0.303427098	0.375000000	1816
09	0.920490498	-0.851836084	3496
10	0.271633455	-0.966859979	7561
11	0.729540393	0.567084630	13414
12	0.975503071	-0.414522883	25114

gem: dabchefgkijnlmposqrutxvwAyz
kvnpdoqihswuzcmegyxbAtajrfl
h0 v54 mqxwriAtnelkayubpjhsvozcfdg

U[2263] edges: 9 blocks: 1 orient: -

9_{95} (0) 1 blinks

$r_?^{56}$ #ts(partial) 420

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	1.000000000	34
05	0.305141982	0.145931659	70
06	0.288675135	0.000000000	319
07	0.856458771	0.756937915	658
08	0.508367052	0.500000000	1816
09	0.682428833	-0.733665474	3496
10	0.093111629	-0.291863317	7561
11	0.755030942	-0.634971543	13414
12	0.852381874	0.733036600	25114

gem: dabcgefjhimklpnosqrvtuxwzyBA
joumdAxgwrtievyqpaksczBhbnfl
h0 v56 tvrowbupyxjgnmdAiBealfskqhzc

U[1223] edges: 9 blocks: 2 orient: +

9_{96} (0) 3^1 9 blinks

$r_?^{42}$ #ts(full) 76

r	mod	theta/pi	#sts
03	0.707106781	-0.500000000	2
04	0.500000000	-0.750000000	34
05	0.493730098	-0.554068341	70
06	0.500000000	0.500000000	319
07	0.598542243	0.589087715	658
08	0.461939766	-0.125000000	1816
09	0.466959541	-0.804224028	3496
10	0.243769410	0.108136683	7561
11	0.420630300	-0.617148037	13414
12	0.570930726	0.712566479	25114

gem: dabchefgkijnlmqopsrut
klqrdsmihuabtonfcepgj
h0 v42 ueimjarlnbhkpcsdgqtof

U[1227] edges: 9 blocks: 2 orient: +

U[2655] edges: 9 blocks: 1 orient: -

U[1792] edges: 9 blocks: 1 orient: +

U[2744] edges: 9 blocks: 2 orient: -

U[1884] edges: 9 blocks: 1 orient: +

U[2748] edges: 9 blocks: 2 orient: -

U[2908] edges: 9 blocks: 2 orient: -

9_{97} (0) 7^1 5 blinks

$r_?^{36}$ #ts(full) 4

r	mod	theta/pi	#sts
03	0.707106781	-0.500000000	2
04	0.500000000	0.750000000	34
05	0.601500955	-0.500000000	70
06	0.288675135	0.000000000	319
07	0.707106781	-0.928571429	658
08	1.115221249	0.125000000	1816
09	0.356145927	-0.961569382	3496
10	0.361803399	0.000000000	7561
11	0.144846489	0.897451897	13414
12	0.714957726	0.845511799	25114

gem: dabchefgkijmlpnorq
kofedcnihgmjrlbqpa
h0 v36 npjlomkbfcgqiarhde

U[1228] edges: 9 blocks: 2 orient: +

U[1789] edges: 9 blocks: 1 orient: +

U[3005] edges: 9 blocks: 1 orient: +

U[1481] edges: 9 blocks: 4 orient: +

U[2864] edges: 9 blocks: 2 orient: -

U[3068] edges: 9 blocks: 1 orient: -

U[1486] edges: 9 blocks: 4 orient: +

9_{98} (0) 2 blinks

$r_?^{52}$ #ts(full) 6892

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	1.000000000	66
05	0.721222998	-0.963081267	130
06	0.288675135	0.000000000	859
07	0.443724355	0.370359264	1588
08	0.349854384	0.500000000	5684
09	0.182397977	0.154877706	9780
10	0.520162612	-0.073837466	25405
11	0.636383056	0.830983984	41030
12	0.428735677	0.735131180	87686

gem: dabchefgkijnlmqoptrsvuxwzyBA
nqfedcvphrwkytsiuBoabgzAxlmj
h0 v56 vxgkojybAzmtsenwrqdlpauhBfic

U[1229] edges: 9 blocks: 2 orient: +

U[2941] edges: 9 blocks: 1 orient: +

9_{99} (1) 5^1 4 blinks

$r_?^{44}$ #ts(full) 1280

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	4
04	0.000000000	0.000000000	38
05	0.381966011	0.800000000	144
06	1.000000000	1.000000000	593
07	1.168189019	-0.703862765	1732
08	0.414213562	0.250000000	4964
09	1.053074939	0.780604382	11780
10	0.507300910	0.254068341	27245
11	0.916273108	0.580551594	55864
12	0.267949192	-0.500000000	112002

gem: dabcgefjhimklpnorqtsvu
gvnqdhmfrpjtaiukecolsb
h0 v44 egosakiqbvrdtmchpulnfj

U[1231] edges: 9 blocks: 1 orient: +

U[2977] edges: 9 blocks: 1 orient: +

U[2102] edges: 9 blocks: 1 orient: -

U[2642] edges: 9 blocks: 1 orient: +

9_{100} (0) 4 blinks

$r_?^{52}$ #ts(full) 2

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	0.000000000	34
05	0.219149851	0.875632347	82
06	0.288675135	0.000000000	379
07	0.755306871	0.530240634	838
08	0.508367052	1.000000000	2428
09	0.520045581	-0.811520780	4732
10	0.048026657	0.248735306	10741
11	0.298090234	-0.284172958	18994
12	0.292470011	0.108850403	36910

gem: eabcdifghljkomnrpqustxvwzy
lqwzfedtjimrkhsoxapnyucbvg
h0 v52 yrkuvolpzwsqiexhgbcjdntfam

U[1241] edges: 9 blocks: 1 orient: +

U[1552] edges: 9 blocks: 1 orient: +

U[2177] edges: 9 blocks: 1 orient: +

9_{101} (0) 5^1 18 blinks

$r_?^{42}$ #ts(full) 2

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	-0.500000000	34
05	0.270090757	-0.100000000	82
06	0.288675135	1.000000000	379
07	0.182528287	-0.679459907	838
08	0.461939766	0.250000000	2428
09	0.607432833	0.528627227	4732
10	0.072949017	0.200000000	10741
11	0.440032924	0.753677456	18994
12	0.904316801	0.547331864	36910

gem: dabcgefjhimklonqpsrut
jqledshgtoirpmanbcukf
h0 v42 tgjkamsrlpuqohfcinbed

U[1663] edges: 9 blocks: 1 orient: -

U[1556] edges: 9 blocks: 1 orient: +

U[1721] edges: 9 blocks: 1 orient: -

U[2116] edges: 9 blocks: 1 orient: +

U[2726] edges: 9 blocks: 3 orient: +

U[2788] edges: 9 blocks: 1 orient: -

U[3044] edges: 9 blocks: 2 orient: +

U[2179] edges: 9 blocks: 1 orient: +

U[2736] edges: 9 blocks: 2 orient: +

U[2853] edges: 9 blocks: 1 orient: -

U[3055] edges: 9 blocks: 2 orient: +

U[2679] edges: 9 blocks: 1 orient: +

U[2785] edges: 9 blocks: 1 orient: -

U[3018] edges: 9 blocks: 1 orient: -

U[3314] edges: 9 blocks: 2 orient: +

9_{102} (0) 16 blinks

$r_?^{48}$ #ts(full) 1

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	1.000000000	34
05	0.533005286	-0.830853420	82
06	0.288675135	0.000000000	379
07	0.507408335	0.320817438	838
08	0.574025149	0.500000000	2428
09	0.581059498	0.579124963	4732
10	0.284094635	-0.338293159	10741
11	0.079682095	0.256956790	18994
12	0.102080957	-0.687167042	36910

gem: dabcgefjhimklpnosqrutwvyx
jpumdwygnactvixboflskerqh
h0 v50 ltvoxiapuyjgnmdrwhcqfsbek

U[1248] edges: 9 blocks: 1 orient: +

U[1642] edges: 9 blocks: 1 orient: +

U[2480] edges: 9 blocks: 1 orient: +

U[1255] edges: 9 blocks: 1 orient: +

U[1710] edges: 9 blocks: 1 orient: +

U[2680] edges: 9 blocks: 1 orient: +

U[1561] edges: 9 blocks: 1 orient: +

U[2180] edges: 9 blocks: 1 orient: +

U[2721] edges: 9 blocks: 1 orient: +

U[2733] edges: 9 blocks: 2 orient: -

U[2961] edges: 9 blocks: 1 orient: -

U[3313] edges: 9 blocks: 2 orient: -

U[2783] edges: 9 blocks: 1 orient: +

U[3016] edges: 9 blocks: 1 orient: -

U[2851] edges: 9 blocks: 1 orient: -

U[3041] edges: 9 blocks: 2 orient: -

9_{103} (0) 5^1 3 blinks

$r_?^{54}$ #ts(full) 7

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	-0.500000000	34
05	0.416847788	-0.775632347	82
06	0.288675135	1.000000000	379
07	0.387831471	0.876109901	838
08	0.237769002	0.250000000	2428
09	0.031049844	-0.960764084	4732
10	0.173762079	-0.448735306	10741
11	0.501292607	-0.017060242	18994
12	0.329085660	0.312287643	36910

gem: dabchefgkijnlmposqrvtuxwzyBA
kjledrvBhmasbwntpfcqozuAxgyi
h0 v56 trxgwincfolkAdvsebzymBqhapuj

U[1251] edges: 9 blocks: 1 orient: +

U[1706] edges: 9 blocks: 1 orient: +

U[2781] edges: 9 blocks: 1 orient: +

9_{104} (0) 9^1 4 blinks

$r_?^{50}$ #ts(full) 2

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	1.000000000	34
05	0.407505394	0.734341190	82
06	0.500000000	-0.500000000	379
07	0.940578933	-0.221509502	838
08	0.574025149	0.500000000	2428
09	0.501584178	0.487914522	4732
10	0.166060646	0.531317619	10741
11	0.565209506	-0.801291897	18994
12	0.624041998	0.811654474	36910

gem: dabchefgkijnlmqopsrutwvyx
krpedcuihwysjtnfbqxovgmla
h0 v50 owuixljbnrfkpdamegtscqyvh

U[1258] edges: 9 blocks: 1 orient: +

U[3054] edges: 9 blocks: 2 orient: -

U[1711] edges: 9 blocks: 1 orient: +

U[2782] edges: 9 blocks: 1 orient: +

9_{105} (0) 5^1 10 blinks

$r_?^{48}$ #ts(full) 6904

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	-0.500000000	34
05	0.674473890	-0.824367653	82
06	0.288675135	1.000000000	379
07	0.439513355	0.880313964	838
08	0.079256334	0.250000000	2428
09	0.138728663	0.044504251	4732
10	0.454915028	-0.351264694	10741
11	0.676625972	0.045431633	18994
12	0.198687476	0.127285205	36910

gem: dabcgefjhimklpnosqrvtuxw
musrdqxgnkjpaiwvbecoflth
h0 v48 tojuckvnlxswhmbqpafrdgie

U[2268] edges: 9 blocks: 1 orient: -

9_{106} (0) 5^1 7 blinks

$r_?^{52}$ #ts(partial) 368

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	-0.500000000	66
05	0.437016024	-0.700000000	130
06	0.288675135	1.000000000	859
07	0.820274676	0.052370506	1588
08	0.303427098	0.250000000	5684
09	0.713588490	0.023354971	9780
10	0.190983006	-0.600000000	25405
11	0.445372699	0.859693708	41030
12	0.341799623	-0.679853662	87686

gem: dabchefgkijnlmposqrvtuxwzy
kmzwdxquhtnjbavgpflsioeyrc
h0 v52 qjpvrzuklbwigontxehcmysadf

U[3065] edges: 9 blocks: 1 orient: -

9_{107} (0) 3^1 1 blinks

$r_?^{56}$ #ts(partial) 356

r	mod	theta/pi	#sts
03	0.707106781	-0.500000000	2
04	0.500000000	0.250000000	66
05	0.659357578	-0.565658810	130
06	0.500000000	0.500000000	859
07	0.608148883	0.890888961	1588
08	1.003135866	0.375000000	5684
09	1.072479696	-0.646494052	9780
10	0.434752416	0.131317619	25405
11	0.574894724	0.905404102	41030
12	0.616286842	0.240727997	87686

gem: dabchefgkijnlmqopsrutwvzxyBA
hAxidkBaevuszonytqjrflcwbmpg
h0 v56 jugfnocwhxqkpsdBlAezbtyaivrm

9_{108} (0) 6^1 5 blinks

$r_?^{36}$ #ts(full) 30

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	0.382683432	-0.750000000	42
05	0.000000000	0.000000000	148
06	0.707106781	-0.250000000	597
07	0.000000000	0.000000000	1664
08	0.287265358	-0.125000000	4616
09	0.000000000	0.000000000	10720
10	1.071080574	0.554599790	24125
11	0.000000000	0.000000000	48980
12	0.207106781	-0.875000000	96186

gem: dabcgefjhimklpnorq
jrmedcognabqfihlpk
h0 v36 qlifodcpgkjbamrhne

9_{109} (0) 6^1 1 blinks

$r_?^{42}$ #ts(full) 1314

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	0.382683432	-0.750000000	42
05	0.000000000	0.000000000	148
06	0.707106781	-0.250000000	597
07	0.000000000	0.000000000	1664
08	0.698211993	0.911923021	4616
09	0.000000000	0.000000000	10720
10	0.216719089	0.302155969	24125
11	0.000000000	0.000000000	48980
12	0.353773305	-0.136224103	96186

gem: dabcgefjhimklpnosqrut
jlredctgnapbimqsoukhf
h0 v42 pgihakbucfjoqtremlnsd

9_{110} (0) 6^1 4 blinks

$r_?^{32}$ #ts(full) 2

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	0.923879532	-0.250000000	42
05	0.000000000	0.000000000	148
06	0.707106781	-0.750000000	597
07	0.000000000	0.000000000	1664
08	0.587937801	-0.875000000	4616
09	0.000000000	0.000000000	10720
10	1.027696142	0.480312683	24125
11	0.000000000	0.000000000	48980
12	0.866025404	-0.125000000	96186

gem: dabcgefjhimklpno
jpmedchglnbofaik
h0 v32 oligchdpekjbnmaf

U[2077] edges: 9 blocks: 3 orient: +

U[2349] edges: 9 blocks: 2 orient: +

9_{111} (0) 9^1 2 blinks

$r_?^{50}$ #ts(full) 16

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	0.000000000	34
05	0.407505394	0.065658810	70
06	0.500000000	-0.500000000	319
07	0.470386173	-0.499390308	658
08	0.415512481	0.000000000	1816
09	0.527905174	0.137557362	3496
10	0.166060646	-0.131317619	7561
11	0.198473994	-0.304013785	13414
12	0.635497309	-0.102416382	25114

gem: eabcdhfgkijnlmporqtsvuywx
hnqxfewkgosvjrmypbautlidc
h0 v50 qjgyxnuihbrkeswfalpmcovtd

U[1367] edges: 9 blocks: 1 orient: +

U[2844] edges: 9 blocks: 1 orient: +

9_{112} (0) 3^1 6 blinks

$r_?^{52}$ #ts(full) 12

r	mod	theta/pi	#sts
03	0.707106781	0.500000000	2
04	0.500000000	-0.250000000	34
05	0.659357578	0.165658810	70
06	0.500000000	-0.500000000	319
07	0.479972316	-0.040515544	658
08	0.303427098	-0.375000000	1816
09	0.758846336	0.125312257	3496
10	0.434752416	0.668682381	7561
11	0.951726811	-0.509284632	13414
12	0.704155434	0.219672871	25114

gem: dabchefgkijnlmqopsrutxvwzy
kjwydtnihmarqglxbofszucpev
h0 v52 msxjplkzfnciodaeuqvyrbtgwh

U[1368] edges: 9 blocks: 1 orient: +

U[2969] edges: 9 blocks: 1 orient: -

U[2845] edges: 9 blocks: 1 orient: +

U[3057] edges: 9 blocks: 2 orient: +

U[2865] edges: 9 blocks: 2 orient: +

U[3217] edges: 9 blocks: 1 orient: +

9_{113} (0) 9^1 1 blinks

$r_?^{62}$ #ts(partial) 601

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	1.000000000	34
05	0.676651102	0.720655987	70
06	0.500000000	-0.500000000	319
07	0.979531220	-0.266068303	658
08	0.191341716	0.500000000	1816
09	1.146895383	0.453921945	3496
10	0.457856714	0.558688026	7561
11	0.318669577	0.060252228	13414
12	0.795227552	-0.877285205	25114

gem: dabchefgkijnlmqoptrsvuywxAzCBED
kEwedvlihgtjfAnzrqBacyuCmxoDpsb
h0 v62 qhmDpkuCErfxcbdeavwgtjAiBysznol

U[1371] edges: 9 blocks: 1 orient: +

9_{114} (0) 5^1 4 blinks

$r_?^{50}$ #ts(full) 707

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	0.500000000	34
05	0.977197538	0.100000000	70
06	0.288675135	1.000000000	319
07	0.940337163	-0.785409299	658
08	1.385819299	-0.250000000	1816
09	1.553760363	-0.418168821	3496
10	0.954915028	-0.200000000	7561
11	1.899053096	0.100497924	13414
12	1.055485780	-0.256037843	25114

gem: dabchefglijknmporqtswuvyx
humpdyjvnwxtlbsekorciagqf
h0 v50 syqfudoihmbvrgncpjaetlxwk

U[1373] edges: 9 blocks: 1 orient: +

U[2984] edges: 9 blocks: 1 orient: -

U[1625] edges: 9 blocks: 1 orient: -

U[1659] edges: 9 blocks: 1 orient: +

9_{115} (0) 4^1 3 blinks

$r_?^{46}$ #ts(full) 9

r	mod	theta/pi	#sts
03	1.000000000	0.250000000	4
04	0.707106781	-0.625000000	46
05	2.427844145	-0.450000000	160
06	0.577350269	-0.333333333	693
07	2.691199208	0.954943398	1916
08	2.724256389	-0.888760100	5560
09	2.021010173	0.214242354	12820
10	4.971162960	0.431257745	29725
11	1.480658934	0.651644480	59960
12	4.978500660	-0.275012268	120222

gem: dabchefgkijmlonrpqtsvuxw
kpuwdxmihlaqgvbojfrctnes
h0 v48 qixrnljpsufkemwcvdbogath

U[1379] edges: 9 blocks: 2 orient: +

U[1890] edges: 9 blocks: 1 orient: +

U[3384] edges: 9 blocks: 2 orient: +

9_{116} (0) 4^1 1 blinks

$r_?^{50}$ #ts(partial) 905

r	mod	theta/pi	#sts
03	1.000000000	-0.250000000	4
04	0.707106781	0.125000000	46
05	1.849943576	-0.317079923	160
06	0.577350269	0.333333333	693
07	2.776256795	-0.195314919	1916
08	0.649286435	-0.407718179	5560
09	4.292555538	-0.342044098	12820
10	3.537383539	-0.768578374	29725
11	2.810921732	-0.499663716	59960
12	4.559108336	-0.969791948	120222

gem: dabcgefjhimklpnosqrutwvyx
jvspdotgrachumfebyklnqxwi
h0 v50 ltiysavmcojfxgwqpburenkhd

9_{117} (0) 1 blinks

$r_?^{46}$ #ts(partial) 604

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	72
05	0.721222998	0.163081267	268
06	0.288675135	0.000000000	1257
07	0.270927115	-0.494655207	3704
08	0.349854384	1.000000000	10976
09	0.343706491	0.220825926	26440
10	0.520162612	-0.326162534	61625
11	0.460650972	-0.564461072	128060
12	0.825249981	-0.146275019	256776

gem: dabcgefjhimklpnosqrutwv
jvuedlograpfcmhkbwtsnqi
h0 v46 rghmaoicbtjnvwuqpedkfsl

U[1424] edges: 9 blocks: 1 orient: +

9_{118} (0) 3^2 2 blinks

$r_?^{40}$ #ts(full) 1

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	72
05	0.141995114	0.000000000	268
06	0.866025404	0.000000000	1257
07	0.748757834	-0.134383415	3704
08	0.574025149	0.000000000	10976
09	0.234325518	-0.666666667	26440
10	0.020162612	0.000000000	61625
11	0.182357329	0.175477954	128060
12	0.895233401	-0.134073673	256776

gem: dabchefgkijnlmporqts
kqsedcoihnmgrjltpafb
h0 v40 qgmjoibrntlkcfshaped

U[1425] edges: 9 blocks: 1 orient: +

U[3040] edges: 9 blocks: 1 orient: -

9_{119} (0) 3^2 5 blinks

$r_?^{36}$ #ts(full) 2

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	72
05	0.371748034	0.200000000	268
06	0.866025404	0.000000000	1257
07	0.770142225	0.067203793	3704
08	0.732537816	0.000000000	10976
09	0.124682004	0.888888889	26440
10	0.138196601	-0.400000000	61625
11	0.206831122	0.163761201	128060
12	0.344136804	-0.127285205	256776

gem: dabcgefjhimklpnorq
jpmrdlhgfnoiqakbce
h0 v36 pohmibrcegjqdlfank

U[1428] edges: 9 blocks: 1 orient: +

U[3038] edges: 9 blocks: 1 orient: -

U[2130] edges: 9 blocks: 1 orient: -

U[3090] edges: 9 blocks: 1 orient: -

U[2243] edges: 9 blocks: 1 orient: +

9_{120} (0) 3^1 2 blinks

$r_?^{58}$ #ts(full) 1

r	mod	theta/pi	#sts
03	0.707106781	-0.500000000	2
04	0.500000000	0.250000000	34
05	0.251852184	0.965658810	74
06	0.500000000	0.500000000	335
07	0.577799334	0.510981805	722
08	0.144914431	0.375000000	2020
09	0.119796837	-0.699338324	3940
10	0.063429523	-0.931317619	8689
11	0.765388933	0.652162014	15446
12	0.784902329	-0.297226098	29406

gem: dabchefglijknmqoptrswuvzxyCABED
hEzedyisnfAoltmCvqagDrBwjckxpub
h0 v62 npfEsBoqhamvwjgbidzutlkrDCyceAx

U[1429] edges: 9 blocks: 1 orient: +

U[1451] edges: 9 blocks: 1 orient: +

9_{121} (0) 3 blinks

$r_?^{52}$ #ts(full) 4

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	1.000000000	34
05	0.219149851	-0.075632347	74
06	0.288675135	0.000000000	335
07	0.622363437	-0.626079932	722
08	0.349854384	-0.500000000	2020
09	0.527831488	0.477942100	3940
10	0.048026657	0.151264694	8689
11	0.579671906	0.808161774	15446
12	0.874348881	-0.986927388	29406

gem: eabcdifghljkomnrpqustxvwzy
lnwgfedzriuokxaysjqvmtpbch
h0 v52 uinyltvpbwfsrchogzekaqjdxm

U[1432] edges: 9 blocks: 1 orient: +

U[1452] edges: 9 blocks: 1 orient: +

U[2907] edges: 9 blocks: 2 orient: -

9_{122} (0) 3^1 4 blinks

$r_?^{54}$ #ts(full) 14

r	mod	theta/pi	#sts
03	0.707106781	-0.500000000	2
04	0.500000000	-0.750000000	34
05	0.587011475	0.728007122	82
06	0.500000000	0.500000000	379
07	0.443518390	-0.878071379	838
08	0.686110531	-0.125000000	2428
09	0.150758159	-0.706211732	4732
10	0.344582472	-0.456014245	10741
11	0.508037201	-0.855155686	18994
12	0.107480158	-0.156593252	36910

gem: dabchefglijknmqoptrsvuywxAz
hAiedpuxqzvmlrntcokfysjagwb
h0 v54 qzfwsnbihApuxcvkjdyltormega

U[1442] edges: 9 blocks: 1 orient: +

U[3073] edges: 9 blocks: 1 orient: +

U[2198] edges: 9 blocks: 1 orient: +

U[2856] edges: 9 blocks: 1 orient: +

9_{123} (1) 2 blinks

$r_?^{48}$ #ts(full) 1884

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	4
04	0.000000000	0.000000000	72
05	0.726542528	-0.700000000	268
06	0.000000000	0.000000000	1257
07	0.782077483	0.222269693	3704
08	0.414213562	-0.250000000	10976
09	0.994158976	-0.388888889	26440
10	1.121318070	-0.424367653	61625
11	0.801614021	-0.631554794	128060
12	0.779548045	-0.388311615	256776

gem: dabchefgkijnlmporqtsvuxw
kwnedcvihoarpsxgblfutmqj
h0 v48 fvitludxpbekhqncowrgajsm

U[1446] edges: 9 blocks: 1 orient: +

U[1824] edges: 9 blocks: 1 orient: +

9_{124} (0) 1 blinks

$r_?^{50}$ #ts(full) 2

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	42
05	0.634136124	-0.842016670	148
06	0.288675135	0.000000000	597
07	0.405025765	-0.030759908	1664
08	1.273733916	0.000000000	4616
09	0.821528456	-0.177026154	10720
10	0.402128624	-0.315966660	24125
11	0.630351343	-0.351387232	48980
12	1.575407565	-0.116147897	96186

gem: dabcgefjhimklpnosqrutwvyx
joredcxgkapyumwilfvsntbhq
h0 v50 lsehcbywgtjnvakqpufoxmdri

U[1458] edges: 9 blocks: 1 orient: +

9_{125} (0) 1 blinks

$r_?^{62}$ #ts(full) 27

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	1.000000000	34
05	0.822620061	0.644778926	70
06	0.288675135	0.000000000	319
07	0.693937186	-0.091603978	658
08	0.191341716	0.500000000	1816
09	0.678127866	0.620105881	3496
10	0.676703764	0.710442147	7561
11	1.029667938	-0.887783113	13414
12	0.674304208	-0.652817568	25114

gem: dabchefgkijnlmqopsrvtuywxAzCBED
hgxkdEqacrDfjonvBmtswAuiCypbzel
h0 v62 jvfxncuzhCskEydwDqlBgbmoeitAarp

U[1461] edges: 9 blocks: 1 orient: +

9_{126} (0) 5 blinks

$r_?^{48}$ #ts(full) 1

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	42
05	0.141995114	-0.200000000	176
06	0.288675135	0.000000000	705
07	0.314455055	-0.481345143	2184
08	0.191341716	1.000000000	6124
09	0.095251192	0.892177536	15028
10	0.020162612	0.400000001	34213
11	0.301979940	-0.138824522	71688
12	0.999011926	-0.074618671	142038

gem: dabchefgkijmlpnorqtsvuxw
hupxdqkjnvgbimftowrclase
h0 v48 wsvlmcrihpdkegaxunbqtfoj

U[1466] edges: 9 blocks: 1 orient: +

U[2233] edges: 9 blocks: 1 orient: +

U[1563] edges: 9 blocks: 1 orient: +

U[2866] edges: 9 blocks: 1 orient: +

U[1738] edges: 9 blocks: 1 orient: +

9_{127} (0) 16 blinks

$r_?^{42}$ #ts(full) 1

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	42
05	0.573741760	0.675632347	176
06	0.288675135	0.000000000	705
07	0.302368913	0.302547636	2184
08	0.191341716	0.000000000	6124
09	0.446412923	0.398777273	15028
10	0.329179607	0.648735306	34213
11	0.753386966	0.349720505	71688
12	1.092784174	0.151271810	142038

gem: eabcdifghljkomnqpsrut
isjufetmqorhlgckapbnd
h0 v42 kjhpnuqcbiasfrdogetlm

U[1469] edges: 9 blocks: 1 orient: +

U[2135] edges: 9 blocks: 1 orient: +

U[2505] edges: 9 blocks: 1 orient: +

U[1743] edges: 9 blocks: 1 orient: +

U[2203] edges: 9 blocks: 2 orient: -

U[2763] edges: 9 blocks: 1 orient: -

U[2111] edges: 9 blocks: 1 orient: +

U[2237] edges: 9 blocks: 1 orient: +

U[2800] edges: 9 blocks: 2 orient: -

U[2805] edges: 9 blocks: 1 orient: +

U[3094] edges: 9 blocks: 1 orient: +

U[3357] edges: 9 blocks: 2 orient: -

U[2868] edges: 9 blocks: 1 orient: +

U[3104] edges: 9 blocks: 2 orient: -

U[3000] edges: 9 blocks: 1 orient: -

U[3218] edges: 9 blocks: 2 orient: -

9_{128} (0) 3^1 6 blinks

$r_?^{58}$ #ts(full) 2

r	mod	theta/pi	#sts
03	0.707106781	-0.500000000	2
04	0.500000000	-0.750000000	34
05	0.547263648	0.300000000	74
06	0.500000000	0.500000000	335
07	1.173773800	-0.743060031	722
08	0.237769002	0.875000000	2020
09	0.454055849	-0.279103222	3940
10	0.299497500	0.400000000	8689
11	0.670224239	-0.785829873	15446
12	0.726132972	0.488870328	29406

gem: dabchefgkijnlmqoptrswuvyxAzDBC
hnzDdpvutqlkByswCaoirgfmbcxAje
h0 v60 CBrvkmbihxuqswnctpfleAojDydgaz

9_{129} (0) 5^1 1 blinks

$r_?^{48}$ #ts(partial) 240

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	0.500000000	66
05	0.707106781	0.100000000	130
06	0.288675135	1.000000000	859
07	0.128706231	0.714285714	1588
08	0.461939766	0.750000000	5684
09	1.336733944	0.333333333	9780
10	0.500000000	-0.200000000	25405
11	0.874150037	-0.229293735	41030
12	0.714957726	-0.904488201	87686

gem: dabchefgkijnlmqoptrsvuxw
hxnvdupabwlkotmjrqfcsegi
h0 v48 wjgftncihbpesdvkaomlqxur

9_{130} (0) 3^1 2 blinks

$r_?^{48}$ #ts(full) 5

r	mod	theta/pi	#sts
03	0.707106781	-0.500000000	2
04	0.500000000	-0.750000000	66
05	0.493730098	0.354068341	130
06	0.500000000	0.500000000	859
07	0.897862870	-0.737119727	1588
08	0.079256334	0.875000000	5684
09	0.256902236	-0.571794196	9780
10	0.243769410	0.291863317	25405
11	0.470513827	-0.751115650	41030
12	0.094734345	0.000000000	87686

gem: dabchefgkijnlmqoptrsvuxw
hsmedljaqtfkcxnrvuwgpibo
h0 v48 jmlrwsunhaxgbitedqvocfpk

9_{131} (0) 5^1 3 blinks

$r_?^{38}$ #ts(full) 2

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	-0.500000000	66
05	0.707106781	-0.900000000	130
06	0.288675135	1.000000000	859
07	0.318026934	0.795946579	1588
08	0.079256334	-0.750000000	5684
09	0.395134764	-0.030254754	9780
10	0.500000000	-0.200000000	25405
11	0.649285896	-0.716571650	41030
12	0.545034801	0.579053683	87686

gem: dabchefgkijnlmqopsr
krfedcnqhsabogmlipj
h0 v38 qhgnaribcflksodmejp

9_{132} (0) 5^1 11 blinks

$r_?^{36}$ #ts(full) 4

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	-0.500000000	34
05	0.437016024	0.900000000	82
06	0.288675135	1.000000000	379
07	0.488964444	-0.375797714	838
08	0.461939766	-0.750000000	2428
09	0.397823687	-0.714441523	4732
10	0.190983006	0.200000000	10741
11	0.483114696	0.668838762	18994
12	0.734490785	0.419842373	36910

gem: dabcgefjhimklpnorq
jonedqlgkaphrmbifc
h0 v36 lnhmibpceqjodfarkg

9_{133} (0) 7 blinks

$r_?^{46}$ #ts(full) 5

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	1.000000000	34
05	0.573741760	0.924367653	82
06	0.288675135	0.000000000	379
07	0.588849168	-0.362938789	838
08	0.032829048	-0.500000000	2428
09	0.491117692	0.193567495	4732
10	0.329179607	0.151264694	10741
11	0.518737558	-0.585110332	18994
12	0.542481506	0.835559021	36910

gem: dabcgefjhimklpnosqrvtuxw
jtwpdomguanshcfexbvrilkq
h0 v48 nluqicxprvjbamdsoehwfktg

9_{134} (1) 1 blinks

$r_?^{36}$ #ts(full) 10

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	8
04	1.000000000	0.000000000	76
05	0.000000000	0.000000000	416
06	1.000000000	0.333333333	1875
07	1.563662965	0.214285714	6760
08	2.414213562	0.000000000	21160
09	1.532088886	-0.111111111	58248
10	1.000000000	0.000000000	145685
11	2.058270847	0.251847142	334928
12	2.909312911	0.054978281	719652

gem: dabcgefjhimklpnorq
jpfedcogqminalrbkh
h0 v36 ofmjiknqlpbergadhc

9_{135} (0) 9^1 1 blinks

U[1513] edges: 9 blocks: 1 orient: +

$r_?^{42}$ #ts(full) 5

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	0.000000000	66
05	0.371748034	1.000000000	130
06	0.500000000	0.500000000	859
07	0.641171545	-0.120606466	1588
08	0.191341716	1.000000000	5684
09	0.085287514	0.055555556	9780
10	0.138196601	0.000000000	25405
11	0.170421523	-0.682294401	41030
12	0.094734345	0.750000000	87686

gem: dabcgefjhimklpnosqrut
julkdphgfqectmsraionb
h0 v42 uemlhaobgnjsckiqptdrf

9_{136} (0) 9^1 3 blinks

$r_?^{44}$ #ts(full) 2

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	0.000000000	34
05	0.305141982	-0.854068341	82
06	0.500000000	-0.500000000	379
07	0.661944335	0.158234536	838
08	0.032829048	0.000000000	2428
09	0.560984751	0.368571730	4732
10	0.093111629	-0.291863317	10741
11	0.319743862	-0.039065067	18994
12	0.390599713	-0.172020870	36910

gem: dabchefgjimklpnosqrutwv
jupvdorthabqnmswlgfikec
h0 v46 slntuimrfpjoavbkdhgqwce

U[1515] edges: 9 blocks: 1 orient: +

U[1526] edges: 9 blocks: 1 orient: +

U[2556] edges: 9 blocks: 1 orient: +

9_{137} (0) 4^1 2 blinks

$r_?^{40}$ #ts(full) 4

r	mod	theta/pi	#sts
03	1.000000000	0.250000000	4
04	0.707106781	0.375000000	40
05	0.811393378	0.074367653	156
06	0.577350269	0.333333333	581
07	0.091869444	0.722169585	1780
08	0.866025404	-0.366586724	4772
09	0.470786746	-0.084454727	11640
10	0.263637690	-0.075632347	25913
11	0.436028309	-0.333987557	54020
12	0.803704376	0.269987808	105676

gem: dabcgefjhimklpnorqts
jskedmqgtacprbhlofni
h0 v40 nleoibrpsqjfamdtkgch

U[1534] edges: 9 blocks: 1 orient: +

U[3085] edges: 9 blocks: 1 orient: +

9_{138} (0) 16^1 4 blinks

$r_?^{38}$ #ts(full) 232

r	mod	theta/pi	#sts
03	1.000000000	-0.250000000	4
04	0.000000000	0.000000000	40
05	1.129775731	0.195931659	156
06	1.154700538	0.000000000	581
07	0.064961507	0.035714285	1780
08	0.765366865	0.437500000	4772
09	0.788206534	0.124606061	11640
10	0.367086387	-0.545931659	25913
11	0.429960593	0.838559566	54020
12	0.732050808	0.125000000	105676

gem: dabcgefjhilkomnqpsr
jirqdksgbaoplcfmenh
h0 v38 rmqjhcpensiabkgofld

U[1540] edges: 9 blocks: 1 orient: +

U[1565] edges: 9 blocks: 2 orient: -

U[2999] edges: 9 blocks: 1 orient: -

U[3086] edges: 9 blocks: 1 orient: +

9_{139} (0) 9^1 2 blinks

$r_?^{50}$ #ts(full) 16586

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	1.000000000	18
05	0.885491183	0.600000000	58
06	0.500000000	0.500000000	211
07	0.563634280	0.705258244	526
08	0.732537816	0.500000000	1384
09	0.606557665	0.666666667	2856
10	0.784094635	0.800000000	6161
11	0.512132350	-0.997943765	11310
12	0.963767388	0.869562114	21218

gem: dabcgefjhimklpnosqrutwvyx
jwkedmygpacqxhluobvsitrfn
h0 v50 xfnlvurpgqjdcmthyiawbeosk

U[1544] edges: 9 blocks: 1 orient: +

U[2956] edges: 9 blocks: 1 orient: -

9_{140} (0) 3^1 6 blinks

$r_?^{46}$ #ts(full) 1

r	mod	theta/pi	#sts
03	0.707106781	-0.500000000	2
04	0.500000000	0.250000000	18
05	0.493730098	0.245931659	58
06	0.500000000	0.500000000	211
07	0.788858921	0.219457799	526
08	0.620452434	-0.625000000	1384
09	1.188920537	0.957431003	2856
10	0.243769410	0.508136683	6161
11	0.344577296	-0.941025705	11310
12	0.842577290	-0.400616160	21218

gem: eabcdifghljkomnrpqustxvw
opugfedctiwmlvabnxrjhqks
h0 v48 whjpuvmkacbqrsdolgnfxtie

9_{141} (0) 4^1 1 blinks

$r_?^{40}$ #ts(full) 2747

r	mod	theta/pi	#sts
03	1.000000000	-0.250000000	4
04	0.707106781	-0.375000000	72
05	0.200811416	0.250000000	268
06	0.577350269	-0.333333333	1257
07	0.091869444	0.507883871	3704
08	0.463104841	0.414916382	10976
09	0.562607654	-0.035558477	26440
10	0.671915800	0.218178351	61625
11	0.754566786	-0.141182720	128060
12	0.670662584	-0.425359324	256776

gem: dabcgefjhimklpnorqts
gthldkrmonjecfispaqb
h0 v40 fsrinahgdoqbtmjckple

9_{142} (0) 9^1 4 blinks

$r_?^{36}$ #ts(full) 3

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	72
05	0.141995114	0.000000000	268
06	0.500000000	-0.500000000	1257
07	0.318026934	-0.918339135	3704
08	0.349854384	1.000000000	10976
09	0.315705916	-0.222222222	26440
10	0.020162612	0.000000000	61625
11	0.336849353	-0.071171470	128060
12	0.401121409	-0.093406748	256776

gem: dabcgefjhimklpnorq
mpredchgqkjnalibof
h0 v36 qfjophabkmiecgrlnd

9_{143} (0) 4^1 6 blinks

$r_?^{38}$ #ts(full) 1

r	mod	theta/pi	#sts
03	1.000000000	0.250000000	4
04	0.707106781	0.875000000	46
05	0.200811416	0.950000000	160
06	1.154700538	0.000000000	693
07	1.659083045	-0.055215109	1916
08	1.140286162	0.245636354	5560
09	1.630753257	0.530029993	12820
10	0.387498750	-0.083429989	29725
11	1.969844832	-0.290568824	59960
12	1.310624849	-0.111243436	120222

gem: dabcgefjhimklpnorqts
jnsrdkhgoapqbmiftecl
h0 v40 tfqokiambejsrldcphng

9_{144} (0) 16^1 4 blinks

$r_?^{40}$ #ts(full) 1

r	mod	theta/pi	#sts
03	1.000000000	-0.250000000	4
04	0.000000000	0.000000000	40
05	1.019963345	0.086918733	204
06	0.577350269	-0.333333333	837
07	0.416379240	0.200135103	2604
08	0.765366865	-0.062500000	7472
09	0.460842353	-0.259499332	18484
10	0.387498750	-0.316570011	42229
11	0.417662648	-0.143990808	89272
12	0.732050808	-0.541666667	177256

gem: dabcgefjhimklpnorqts
jsledkhgfricnmbtpaoq
h0 v40 phsqbjleofntidmakcrg

9_{145} (0) 3^2 1 blinks

$r_?^{48}$ #ts(full) 5

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	74
05	0.843294502	-0.083429989	272
06	0.866025404	0.000000000	1329
07	0.457057394	0.025036957	3844
08	0.415512481	0.000000000	11736
09	0.098598360	-0.142368331	27820
10	0.711145618	0.166859979	66225
11	0.523994775	-0.016479919	135880
12	0.538137357	-0.029046484	276666

gem: dabchefgkijnlmqopsrvtuxw
hipedxljnagkvsmurqbwcotf
h0 v48 grelmupihxnwcktafvosqbdj

9_{146} (1) 1 blinks

$r_?^{48}$ #ts(full) 4

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	4
04	0.000000000	0.000000000	40
05	0.726542528	0.500000000	156
06	0.000000000	0.000000000	581
07	1.469820564	0.720928251	1780
08	1.158941651	0.418673297	4772
09	0.429979877	-0.522553309	11640
10	0.898055953	0.700000000	25913
11	0.441578193	0.338717643	54020
12	0.973365870	0.622714795	105676

gem: dabchefgkijnlmqoptrsvuxw
ntfedcbshqwkpvruxoigmalj
h0 v48 pjslowkaubgqrenhdxcitfvm

9_{147} (0) 16^1 1 blinks

$r_?^{32}$ #ts(full) 8

r	mod	theta/pi	#sts
03	1.000000000	0.250000000	4
04	1.000000000	0.625000000	40
05	0.525731112	-0.250000000	156
06	1.154700538	0.000000000	581
07	1.460870634	0.406661084	1780
08	1.000000000	0.437500000	4772
09	0.121323411	0.416666667	11640
10	0.447213595	0.400000000	25913
11	1.606822612	0.301088952	54020
12	1.154700538	0.541666667	105676

gem: dabcgefjhilknmpo
jnlodphgkamfibec
h0 v32 mkigcodpebjalfnh

U[1586] edges: 9 blocks: 1 orient: +

9_{148} (0) 16^1 1 blinks

r_{420}^{30} #ts(full) 14

r	mod	theta/pi	#sts
03	1.000000000	0.250000000	4
04	1.000000000	0.625000000	40
05	1.129775731	0.604068341	156
06	0.577350269	0.333333333	581
07	0.182018097	0.392857143	1780
08	1.000000000	0.437500000	4772
09	1.508334324	0.252901947	11640
10	0.867632644	0.236918733	25913
11	1.236234838	0.479293735	54020
12	1.527525232	0.314481141	105676

gem: dabcgefjhimklon
jmledcngkaiobhf
h0 v30 lkifndcmgbjaoeh

U[1588] edges: 9 blocks: 1 orient: +

9_{149} (0) 9^1 2 blinks

$r_?^{52}$ #ts(full) 4

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	1.000000000	66
05	0.721222998	0.836918733	130
06	0.500000000	0.500000000	859
07	0.707019336	-0.181056531	1588
08	0.032829048	-0.500000000	5684
09	0.734667690	0.230094329	9780
10	0.520162612	0.326162534	25405
11	0.350764584	-0.541110082	41030
12	0.612372436	0.750000000	87686

gem: dabchefgkijnlmporqustwvyxAz
krfedcuwhApjxqnaosbmgtivzyl
h0 v54 Aymkrltaceqvipxwzjogfunsbdh

U[1589] edges: 9 blocks: 1 orient: +

U[1682] edges: 9 blocks: 1 orient: +

9_{150} (0) 5^1 5 blinks

$r_?^{44}$ #ts(full) 17

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	0.500000000	66
05	0.437016024	0.100000000	130
06	0.288675135	1.000000000	859
07	0.472606344	0.656967215	1588
08	0.303427098	0.750000000	5684
09	0.595668315	0.228902444	9780
10	0.190983006	-0.200000000	25405
11	0.635287354	-0.228600564	41030
12	0.538030402	-0.738153184	87686

gem: dabcgefjhimklpnosqrutwv
jrqedcugkpitnmsawbovhlf
h0 v46 tlojbkqnswreahcgpfumvid

U[1590] edges: 9 blocks: 1 orient: +

U[2747] edges: 9 blocks: 2 orient: +

U[1684] edges: 9 blocks: 1 orient: +

U[3285] edges: 9 blocks: 3 orient: -

U[2641] edges: 9 blocks: 2 orient: -

9_{151} (0) 4^1 1 blinks

$r_?^{48}$ #ts(partial) 1025

r	mod	theta/pi	#sts
03	1.000000000	-0.250000000	4
04	0.707106781	-0.875000000	72
05	1.743652839	0.520299312	268
06	1.154700538	0.000000000	1257
07	1.305235308	-0.790489738	3704
08	2.423080755	0.677086573	10976
09	1.762935229	0.099558337	26440
10	1.945145788	-0.567079923	61625
11	2.450669673	0.889879505	128060
12	1.341879750	0.266576303	256776

gem: dabcgefjhimklpnosqrvtuxw
mosudtxgqkjiplbanwcfervh
h0 v48 oqfpwhbcmteuijrdganslxkv

U[1593] edges: 9 blocks: 1 orient: +

9_{152} (0) 9^1 4 blinks

$r_?^{52}$ #ts(full) 19

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	1.000000000	34
05	0.740288226	-0.881121839	82
06	0.500000000	-0.500000000	379
07	0.720776256	0.111709574	838
08	0.191341716	0.500000000	2428
09	0.760959800	-0.406297668	4732
10	0.548026657	-0.237756321	10741
11	0.491566491	0.786747302	18994
12	0.547432601	-0.709566933	36910

gem: dabchefgkijnlmqopsrutwvyxAz
hozedxjpsvlkfAnawqurigtmcyb
h0 v54 spnmtoqxhrvewcfbzjylkudiAga

U[1612] edges: 9 blocks: 1 orient: +

U[2786] edges: 9 blocks: 1 orient: +

U[1660] edges: 9 blocks: 1 orient: +

U[2114] edges: 9 blocks: 1 orient: -

9_{153} (0) 5^1 10 blinks

$r_?^{46}$ #ts(full) 10

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	0.500000000	34
05	0.674473890	0.575632347	82
06	0.288675135	1.000000000	379
07	0.327600330	-0.540319827	838
08	0.079256334	-0.250000000	2428
09	0.385041078	0.688597840	4732
10	0.454915028	0.848735306	10741
11	0.964118076	-0.991600641	18994
12	0.479662002	-0.375392086	36910

gem: dabcgefjhimklpnosqrutwv
jkprdqtglwbvumfsoechnia
h0 v46 nulovckspgjftrdwmahqbei

9_{154} (0) 2 blinks

$r_?^{52}$ #ts(full) 1

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	1.000000000	34
05	1.318715156	-0.934341190	82
06	0.288675135	0.000000000	379
07	1.462608123	0.343220405	838
08	1.115221249	0.500000000	2428
09	1.199040190	-0.443334424	4732
10	1.739009663	-0.131317619	10741
11	1.289001803	0.515353542	18994
12	1.557396556	-0.989975646	36910

gem: dabchefgkijnlmqopsrutwvyxAz
hrxedvlpnqgkuysajAofmtcwzib
h0 v54 swglomyAhvuqxentdpjrkazfcbi

9_{155} (0) 11^1 1 blinks

$r_?^{38}$ #ts(full) 253

r	mod	theta/pi	#sts
03	0.707106781	-0.500000000	4
04	0.500000000	-0.750000000	42
05	0.573741760	-0.975632347	208
06	0.288675135	1.000000000	877
07	0.856255886	0.357142857	2744
08	0.844623199	-0.125000000	7876
09	0.239622258	-0.579853891	19540
10	0.329179607	0.951264694	44937
11	0.320884810	-0.863636364	94720
12	0.460571866	0.619926531	188718

gem: dabcgefjhimklonqpsr
gsjodkprfmincleahqb
h0 v38 foqhmadgrpjbnelksic

9_{156} (0) 5^1 4 blinks

$r_?^{50}$ #ts(full) 1

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	-0.500000000	34
05	0.847848483	-0.463081267	82
06	0.288675135	1.000000000	379
07	0.363294685	0.831882359	838
08	0.686110531	-0.750000000	2428
09	0.437681400	0.482962589	4732
10	0.718847051	0.926162534	10741
11	0.643293159	-0.805672931	18994
12	0.571545092	0.603752444	36910

gem: dabchefgkijnlmqopsrvtuywxAz
kwuAdqpihnxgojrlfyzscbvamte
h0 v54 tisxmlzwqvfkeonhbpyadArucgj

9_{157} (0) 9^1 2 blinks

$r_?^{48}$ #ts(full) 8

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	0.000000000	66
05	0.573741760	-0.475632347	130
06	0.500000000	0.500000000	859
07	0.243647527	-0.035403393	1588
08	0.732537816	0.000000000	5684
09	0.801331354	-0.644536259	9780
10	0.329179607	0.951264694	25405
11	0.263986216	-0.914001096	41030
12	0.616286842	0.214104768	87686

gem: dabchefglijkpmnosqrutwvyxAz
lkredtAzhpoafsyjmuvqcnxwbig
h0 v54 gnmkuozysrtclbAqpwixvejdhaf

9_{158} (0) 5^1 1 blinks

$r_?^{60}$ #ts(partial) 788

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	-0.500000000	34
05	0.358715914	-0.045931659	70
06	0.288675135	1.000000000	319
07	0.504059956	0.133158515	658
08	0.144914431	-0.750000000	1816
09	0.787127154	-0.298381170	3496
10	0.128677107	0.091863317	7561
11	0.242652521	0.284696827	13414
12	0.370074100	0.952872422	25114

gem: dabchefgkijnlmqoptrsvuxwzyBADC
ksyedzCihAqjuonmaxbptDvfcrlgBw
h0 v60 tvkjwmbufocCirdlDqeBygshxAzapn

9_{159} (0) 3^1 2 blinks

$r_?^{54}$ #ts(full) 3

r	mod	theta/pi	#sts
03	0.707106781	0.500000000	2
04	0.500000000	-0.250000000	66
05	0.354591908	0.624367653	130
06	0.500000000	-0.500000000	859
07	0.244841935	-0.885869518	1588
08	0.079256334	0.625000000	5684
09	0.722942933	0.958384910	9780
10	0.125735421	-0.248735306	25405
11	0.759021753	-0.627492082	41030
12	0.412937438	0.130073469	87686

gem: dabchefgkijnlmposqrutwvyxAz
hrmAdzlwpqgkybniuovsjtafcxe
h0 v54 mguqkrblhvziawydptAfconsjex

U[1722] edges: 9 blocks: 1 orient: +

U[1758] edges: 9 blocks: 1 orient: +

9_{160} (0) 3^1 2 blinks

$r_?^{50}$ #ts(full) 39

r	mod	theta/pi	#sts
03	0.707106781	0.500000000	4
04	0.500000000	0.750000000	46
05	0.659357578	0.965658810	184
06	0.500000000	-0.500000000	789
07	0.889237290	-0.178977397	2360
08	0.844623199	0.125000000	6876
09	0.741125745	0.565145034	16496
10	0.434752416	-0.931317619	38465
11	0.041437827	-0.755324653	79336
12	0.612372436	1.000000000	159786

gem: dabcgefjhimklpnosqrutwvyx
jqoydmhgraxvsltbpifcnukwe
h0 v50 lfqstvkmpgjayxducworibenh

U[1726] edges: 9 blocks: 1 orient: +

U[2836] edges: 9 blocks: 1 orient: -

9_{161} (0) 11^1 2 blinks

$r_?^{38}$ #ts(full) 8

r	mod	theta/pi	#sts
03	0.707106781	0.500000000	4
04	0.500000000	0.750000000	46
05	0.798872081	-0.954068341	184
06	0.288675135	1.000000000	789
07	0.427396691	-0.567203793	2360
08	0.461939766	0.125000000	6876
09	0.353139798	0.078108864	16496
10	0.638196601	0.908136683	38465
11	0.409328090	-0.570885987	79336
12	0.380971319	0.839456188	159786

gem: dabcgefjhimklonqpsr
jisedrqgmapobkfnhlc
h0 v38 lfrhiskoqgjanmdcepb

U[1728] edges: 9 blocks: 1 orient: +

U[2225] edges: 9 blocks: 1 orient: -

9_{162} (0) 3^1 4 blinks

$r_?^{42}$ #ts(full) 1

r	mod	theta/pi	#sts
03	0.707106781	0.500000000	4
04	0.500000000	0.750000000	46
05	0.493730098	0.554068341	184
06	0.500000000	-0.500000000	789
07	0.096845405	0.875797715	2360
08	0.079256334	-0.875000000	6876
09	0.493703845	-0.291101292	16496
10	0.243769410	-0.108136683	38465
11	0.565198929	0.555760265	79336
12	0.801841127	1.000000000	159786

gem: dabchefgkijnlmqopsrut
kqtedrnihmaojglfupcsb
h0 v42 mfqpjbarnohksuetclgdi

U[1729] edges: 9 blocks: 1 orient: +

U[2975] edges: 9 blocks: 1 orient: -

U[2227] edges: 9 blocks: 1 orient: +

U[2837] edges: 9 blocks: 1 orient: -

9_{163} (0) 3^2 2 blinks

$r_?^{44}$ #ts(full) 34

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	46
05	0.573741760	0.324367653	184
06	0.866025404	0.000000000	789
07	0.395987850	-0.166028250	2360
08	0.191341716	1.000000000	6876
09	0.413942163	0.770343793	16496
10	0.329179607	-0.648735306	38465
11	0.570897515	-0.699955709	79336
12	0.049038106	-0.500000000	159786

gem: dabcgefjhimklpnosqrvtu
jutldrhgfvsenmcqpikoba
h0 v44 usehcnivgfjpqkbrtlomad

U[1734] edges: 9 blocks: 1 orient: +

U[2396] edges: 9 blocks: 1 orient: +

9_{164} (1) 3^1 8 blinks

$r_?^{42}$ #ts(full) 2

r	mod	theta/pi	#sts
03	1.000000000	-0.500000000	4
04	1.000000000	0.250000000	46
05	1.328131026	-0.554068341	184
06	1.732050808	0.500000000	789
07	0.643104132	-0.214285714	2360
08	1.585786438	0.375000000	6876
09	0.867280227	-0.128236049	16496
10	0.589511796	0.124367653	38465
11	0.665808306	0.756330968	79336
12	0.866769112	0.070146338	159786

gem: dabchefgkijnlmqopsrut
krmedlqihtafconbupjsg
h0 v42 mgfqjobaspuktrceindhl

U[1736] edges: 9 blocks: 1 orient: +

U[2405] edges: 9 blocks: 1 orient: +

U[2705] edges: 9 blocks: 1 orient: +

U[2176] edges: 9 blocks: 1 orient: +

U[2463] edges: 9 blocks: 1 orient: -

U[2829] edges: 9 blocks: 1 orient: +

U[2347] edges: 9 blocks: 2 orient: +

U[2666] edges: 9 blocks: 2 orient: +

9_{165} (0) 9^1 2 blinks

$r_?^{58}$ #ts(partial) 816

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	1.000000000	66
05	0.305141982	-0.745931659	130
06	0.500000000	0.500000000	859
07	1.038374378	-0.018771459	1588
08	0.415512481	-0.500000000	5684
09	0.253511216	0.135409447	9780
10	0.093111629	-0.508136683	25405
11	0.656047687	-0.769031090	41030
12	0.668428582	-0.968046589	87686

gem: dabchefglijkomnrpqtsvuxwzyBADC
hCAwdpDartbmlkfouiqzsevyxBcjng
h0 v60 vACqtyBohdprwaukjslcinmgfDzxeb

U[1882] edges: 9 blocks: 1 orient: +

9_{166} (0) 3^1 15 blinks

$r_?^{48}$ #ts(full) 43

r	mod	theta/pi	#sts
03	0.707106781	-0.500000000	2
04	0.500000000	0.250000000	66
05	0.712531706	-0.639303917	130
06	0.500000000	0.500000000	859
07	0.716917712	-0.799911722	1588
08	1.227306631	0.375000000	5684
09	0.750180034	-0.415584853	9780
10	0.507701433	0.278607834	25405
11	0.612011325	-0.952804178	41030
12	0.211832436	0.647583618	87686

gem: dabcgefjhimklpnosqrvtuxw
mrtwdvhgpkjiafusoblxqnec
h0 v48 ugkvailxoesbnmfqpwcrjdth

U[1791] edges: 9 blocks: 1 orient: +

U[1983] edges: 9 blocks: 1 orient: -

U[2339] edges: 9 blocks: 1 orient: -

U[2418] edges: 9 blocks: 1 orient: -

U[3003] edges: 9 blocks: 1 orient: +

U[1885] edges: 9 blocks: 1 orient: +

U[2152] edges: 9 blocks: 1 orient: +

U[2343] edges: 9 blocks: 1 orient: -

U[2419] edges: 9 blocks: 1 orient: -

U[3064] edges: 9 blocks: 1 orient: -

U[1886] edges: 9 blocks: 1 orient: +

U[2253] edges: 9 blocks: 1 orient: +

U[2378] edges: 9 blocks: 1 orient: -

U[2651] edges: 9 blocks: 1 orient: -

U[3106] edges: 9 blocks: 1 orient: +

9_{167} (0) 2 blinks

$r_?^{58}$ #ts(full) 4662

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	1.000000000	66
05	0.533005286	0.769146580	130
06	0.288675135	0.000000000	859
07	0.498997727	-0.775715890	1588
08	0.415512481	-0.500000000	5684
09	0.463948619	-0.862580021	9780
10	0.284094635	0.461706841	25405
11	0.544166495	-0.253483525	41030
12	0.688855672	-0.772814474	87686

gem: dabchefgkijnlmqoptrswuvyxAzCBED
hCAndErazqykuDbBwpfmtxjvlicgoes
h0 v62 lvfrscbohmDqjinuCEekAgBwzypxatd

U[1806] edges: 9 blocks: 1 orient: +

U[1856] edges: 9 blocks: 1 orient: +

9_{168} (0) 4^1 1 blinks

$r_?^{52}$ #ts(partial) 867

r	mod	theta/pi	#sts
03	1.000000000	-0.250000000	4
04	0.707106781	0.625000000	86
05	0.753783304	0.019146580	296
06	0.577350269	-0.333333333	1641
07	1.017947180	-0.281816142	4444
08	0.866025404	-0.133413276	14736
09	0.773108425	-0.145834443	33220
10	0.305021828	0.449671663	83625
11	1.406449233	0.613560349	165280
12	1.244132032	0.097933772	350166

gem: dabchefgkijmlpnosqrutwvzxy
mjsxdzvohnlkabiqpucgwtyerf
h0 v52 tizojrlxvehyqmdcufasnbkwgp

U[1828] edges: 9 blocks: 1 orient: +

9_{169} (0) 9^1 1 blinks

$r_?^{40}$ #ts(partial) 646

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	42
05	0.371748034	-0.200000000	148
06	0.500000000	-0.500000000	597
07	0.634884924	-0.907807284	1664
08	0.732537816	1.000000000	4616
09	0.707106781	0.500000000	10720
10	0.138196601	0.400000000	24125
11	0.091722682	0.909090909	48980
12	0.353553391	-0.250000000	96186

gem: dabcgefjhimklpnorqts
jtqodnhgrapcfmeklsib
h0 v40 ogtplksqcfjeahrdnmbi

U[1868] edges: 9 blocks: 4 orient: +

9_{170} (0) 11^1 1 blinks

$r_?^{36}$ #ts(full) 4

r	mod	theta/pi	#sts
03	0.707106781	0.500000000	4
04	0.500000000	0.750000000	42
05	0.371748034	-0.900000000	148
06	0.288675135	1.000000000	597
07	0.714600034	-0.846910564	1664
08	0.461939766	-0.875000000	4616
09	0.105235305	0.833333334	10720
10	0.138196601	0.800000000	24125
11	0.707106781	-0.772727273	48980
12	0.809630852	-0.677420481	96186

gem: dabcgefjhimklpnorq
jromdlngpacfehkqib
h0 v36 ngiqlkbprfjeamdhoc

U[1869] edges: 9 blocks: 4 orient: +

9_{171} (0) 2^1 3 blinks

$r_?^{44}$ #ts(full) 13

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	0.382683432	0.000000000	48
05	0.000000000	0.000000000	220
06	0.788675135	1.000000000	1065
07	0.000000000	0.000000000	3108
08	0.298414962	0.912713694	9536
09	0.000000000	0.000000000	22748
10	0.660113865	0.711702483	54913
11	0.000000000	0.000000000	112040
12	0.150846371	-0.840395416	230392

gem: dabcgefjhimklpnorqtsvu
juoedtmgpafrhlsvkncqbi
h0 v44 lphmkvacsejgdfutoirbqn

U[2824] edges: 9 blocks: 1 orient: +

U[2672] edges: 9 blocks: 1 orient: -

9_{172} (0) 10^1 4 blinks

$r_?^{36}$ #ts(full) 951

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	0.923879533	1.000000000	48
05	0.000000000	0.000000000	220
06	0.788675135	0.000000000	1065
07	0.000000000	0.000000000	3108
08	0.847242829	0.938482682	9536
09	0.000000000	0.000000000	22748
10	0.707106781	0.050000000	54913
11	0.000000000	0.000000000	112040
12	0.726121125	0.938209321	230392

gem: dabcgefjhimklpnorq
jkoedcngrapqhmfbli
h0 v36 nlkihmpeqcjbfadrog

U[1877] edges: 9 blocks: 2 orient: +

U[2676] edges: 9 blocks: 1 orient: +

U[2070] edges: 9 blocks: 3 orient: +

U[2330] edges: 9 blocks: 1 orient: -

9_{173} (0) 4^1 1 blinks

$r_?^{54}$ #ts(partial) 500

r	mod	theta/pi	#sts
03	1.000000000	0.250000000	4
04	0.707106781	0.875000000	46
05	1.343226432	-0.878007122	160
06	1.154700538	0.000000000	693
07	1.987489392	0.035255749	1916
08	0.240024675	0.518826703	5560
09	3.460725371	-0.869572883	12820
10	2.070937244	-0.609539354	29725
11	4.449707833	-0.137273242	59960
12	3.761847182	0.032724831	120222

gem: dabchefgkijmlpnosqrvtuxwAyz
mAzxdwouhtlkrvgypajsinceqfb
h0 v54 yjtorpxsAgaenmzvilhcwfubkdq

U[1889] edges: 9 blocks: 1 orient: +

9_{174} (0) 6^1 1 blinks

$r_?^{42}$ #ts(full) 4

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	0.382683432	-0.250000000	54
05	0.000000000	0.000000000	200
06	0.707106781	0.250000000	937
07	0.000000000	0.000000000	2664
08	0.577365218	0.593445880	8140
09	0.000000000	0.000000000	18928
10	0.634004431	0.095346851	45445
11	0.000000000	0.000000000	91776
12	0.641672798	-0.894809631	188546

gem: dabchefgkijnlmqopsrut
kortdunihpasbqmjgflec
h0 v42 mgpulqbanrekhtjsfocid

U[1925] edges: 9 blocks: 1 orient: +

9_{175} (1) 4^1 1 blinks

$r_?^{42}$ #ts(partial) 988

r	mod	theta/pi	#sts
03	1.414213562	-0.250000000	8
04	1.000000000	0.875000000	98
05	3.280843188	0.419146580	536
06	3.000000000	0.000000000	2575
07	3.326616259	-0.725829180	9328
08	5.082167562	0.788508795	29900
09	4.363323426	0.222679345	82608
10	6.288811516	-0.384289187	208897
11	6.221859690	-0.858983569	481448
12	5.598191312	0.456292158	1040582

gem: dabcgefjhimklpnosqrut
jtnedlkgsapfcmqhoburi
h0 v42 pehqiatcbujnrskfdmlgo

U[1967] edges: 9 blocks: 1 orient: +

9_{176} (1) 4^1 5 blinks

$r_?^{34}$ #ts(full) 1

r	mod	theta/pi	#sts
03	1.414213562	-0.250000000	8
04	0.000000000	0.000000000	98
05	2.182643357	0.174367653	536
06	2.645751311	-0.106147807	2575
07	0.629384245	-0.107142857	9328
08	2.828427125	0.187500000	29900
09	3.362351452	-0.042957818	82608
10	1.433781047	0.030853420	208897
11	3.777539815	0.155543386	481448
12	4.000000000	-0.041666667	1040582

gem: dabchefgkijnlmqop
kqnedcmihoabpfjgl
h0 v34 jgpliqbanhdkoemcf

U[1970] edges: 9 blocks: 1 orient: +

U[2979] edges: 9 blocks: 2 orient: -

U[1971] edges: 9 blocks: 1 orient: +

U[3269] edges: 9 blocks: 2 orient: -

U[2280] edges: 9 blocks: 1 orient: -

9_{177} (1) 4^1 4 blinks

r_{9140}^{30} #ts(full) 7

r	mod	theta/pi	#sts
03	1.414213562	-0.250000000	8
04	1.000000000	-0.125000000	98
05	2.288245611	0.050000000	536
06	3.000000000	0.000000000	2575
07	2.000000000	0.079312442	9328
08	2.797932652	0.356173297	29900
09	3.741657387	0.356147808	82608
10	2.236067977	0.400000000	208897
11	2.449489743	0.793148887	481448
12	3.605551275	0.812167042	1040582

gem: dabchefgkijmlon
kmoedclihgajnbf
h0 v30 gfjnokamecbdhli

U[1975] edges: 9 blocks: 1 orient: +

U[3267] edges: 9 blocks: 2 orient: -

U[1999] edges: 9 blocks: 1 orient: -

U[3132] edges: 9 blocks: 3 orient: -

9_{178} (0) 3^1 4 blinks

$r_?^{56}$ #ts(full) 2

r	mod	theta/pi	#sts
03	0.707106781	-0.500000000	2
04	0.500000000	0.250000000	34
05	0.646166766	-0.515710813	74
06	0.500000000	0.500000000	335
07	0.376617178	0.808885393	722
08	1.068793963	0.375000000	2020
09	0.203733757	0.244557838	3940
10	0.417531489	0.031421626	8689
11	0.312686599	0.457703330	15446
12	0.433039410	0.253535322	29406

gem: dabchefgkijnlmqoptrswuvyxBzADC
kAsedcrphyBwzCnDgqfutblmjxvaoi
h0 v60 mfzBACjtnplkaxugvodhyqiwrcDsbe

U[2331] edges: 9 blocks: 1 orient: +

U[2375] edges: 9 blocks: 1 orient: +

9_{179} (0) 7^1 8 blinks

$r_?^{50}$ #ts(full) 2

r	mod	theta/pi	#sts
03	0.707106781	-0.500000000	2
04	0.500000000	-0.250000000	34
05	0.624233485	-0.586167270	74
06	0.288675135	0.000000000	335
07	0.960771339	-0.972169585	722
08	0.349854384	0.625000000	2020
09	0.227411619	-0.664980228	3940
10	0.389667444	0.172334540	8689
11	0.424351868	0.923805236	15446
12	0.873185687	0.330662063	29406

gem: dabchefgkijmlpnorqtsvuxwzy
htnedlrkwuapcmyfovjzsxigqb
h0 v52 vgftmqbuhpykodxzcwrniaselj

U[1982] edges: 9 blocks: 1 orient: +

U[2417] edges: 9 blocks: 1 orient: +

U[3004] edges: 9 blocks: 1 orient: -

U[2336] edges: 9 blocks: 1 orient: +

U[2653] edges: 9 blocks: 1 orient: +

U[3066] edges: 9 blocks: 1 orient: +

U[2377] edges: 9 blocks: 1 orient: +

U[2741] edges: 9 blocks: 2 orient: -

9_{180} (2) 1 blinks

$r_?^{44}$ #ts(full) 177

r	mod	theta/pi	#sts
03	1.414213562	0.000000000	8
04	1.000000000	1.000000000	118
05	3.531591136	0.624367653	680
06	1.732050808	0.333333333	3427
07	3.492914996	0.890973934	12752
08	4.491277421	0.565948829	41724
09	2.137696553	-0.952084422	116880
10	7.868279993	0.767079923	298725
11	3.622631174	0.451744350	693880
12	6.908838600	0.964545125	1509026

gem: dabcgefjhimklpnorqtsvu
jtmudlpgoasnvfqhikrbec
h0 v44 lkftosirvbjadmeuphcnqg

U[1997] edges: 9 blocks: 1 orient: +

9_{181} (0) 2 blinks

$r_?^{60}$ #ts(full) 4

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	1.000000000	34
05	0.175515613	0.400000000	70
06	0.288675135	0.000000000	319
07	0.285362093	-0.290505809	658
08	0.732537816	-0.500000000	1816
09	0.575807654	-0.378542251	3496
10	0.030805730	-0.800000001	7561
11	0.551405577	0.712543863	13414
12	0.543484606	1.000000000	25114

gem: dabchefgkijnlmqopsrutwvzxyCABED
htyvdwiuqflkzCnrgpBsaexjcEDboAm
h0 v62 wzmAsqCBhcoyDbrElkedxuavfntigjp

U[2014] edges: 9 blocks: 1 orient: +

U[2261] edges: 9 blocks: 1 orient: -

9_{182} (0) 4^1 1 blinks

$r_?^{48}$ #ts(partial) 1031

r	mod	theta/pi	#sts
03	1.000000000	0.250000000	4
04	0.707106781	-0.125000000	166
05	0.525731112	-0.050000000	584
06	1.154700538	0.000000000	4487
07	2.535803101	-0.019418423	12764
08	1.155762275	-0.102941752	52212
09	0.674810760	-0.731312625	124428
10	0.170820393	-0.200000000	364953
11	1.106431677	-0.656761421	761728
12	1.879545708	-0.724383840	1818514

gem: dabchefgkijnlmqoptrsvuxw
hxprdunasclkoqmjwviftegb
h0 v48 sugfxdcbhnmvpjtkrqlwiaoe

U[2023] edges: 9 blocks: 2 orient: +

9_{183} (1) 1 blinks

$r_?^{40}$ #ts(full) 14

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	8
04	1.000000000	0.000000000	108
05	0.000000000	0.000000000	640
06	0.000000000	0.000000000	3127
07	0.801937736	1.000000000	11752
08	1.000000000	1.000000000	38024
09	1.285575219	0.722222222	106920
10	0.618033989	0.400000000	271945
11	0.959846053	0.099543132	632720
12	0.732050808	-0.166666667	1372676

gem: dabcgefjhimklpnorqts
jrpedohgmtfqibkcsnla
h0 v40 nlesthorbkjiamdqpfgc

U[2029] edges: 9 blocks: 1 orient: +

9_{184} (1) 2 blinks

$r_?^{48}$ #ts(full) 29

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	4
04	0.000000000	0.000000000	46
05	0.381966011	-0.800000000	188
06	0.000000000	0.000000000	765
07	0.504726977	0.099258986	2368
08	0.717438935	0.195913276	6668
09	0.737891832	0.277777778	16296
10	0.236067978	0.000000000	37237
11	0.240890652	-0.432707274	77884
12	0.866769112	-0.679853662	154394

gem: dabcgefjhimklpnosqrvtuxw
jxvodmrgwaenslkuphfbqcit
h0 v48 tqpwxclmskjvobhfnairdgue

U[2034] edges: 9 blocks: 1 orient: +

U[2086] edges: 9 blocks: 1 orient: +

9_{185} (0) 4^1 3 blinks

$r_?^{40}$ #ts(full) 2

r	mod	theta/pi	#sts
03	1.000000000	0.250000000	4
04	0.707106781	0.875000000	46
05	0.200811416	0.950000000	188
06	0.577350269	0.333333333	765
07	0.599674716	-0.981535077	2368
08	1.124597095	-0.728631455	6668
09	0.716299119	-0.545863454	16296
10	0.529764523	-0.460696083	37237
11	0.596297622	-0.195709881	77884
12	0.806229600	0.091773110	154394

gem: dabcgefjhimklpnorqts
jpmedlhgqtbrcsikofna
h0 v40 qisntmoebrjdplcfakgh

U[2039] edges: 9 blocks: 1 orient: +

U[2769] edges: 9 blocks: 2 orient: -

U[2988] edges: 9 blocks: 1 orient: -

9_{186} (0) 12^1 1 blinks

$r_?^{36}$ #ts(full) 1

r	mod	theta/pi	#sts
03	1.000000000	-0.250000000	8
04	0.707106781	-0.875000000	132
05	0.850650808	-0.750000000	744
06	1.000000000	0.500000000	4505
07	2.093113139	-0.424180386	17048
08	1.778823646	0.653194166	64912
09	1.303626487	-0.125859861	188616
10	1.283438193	0.134341190	545353
11	2.060205061	-0.829437541	1322600
12	2.732050808	0.291666667	3186596

gem: dabcgefjhimklpnorq
jmpedqngkaihblfroc
h0 v36 qkiorpcmgbjahedfln

U[2051] edges: 9 blocks: 3 orient: +

9_{187} (0) 12^1 1 blinks

$r_?^{38}$ #ts(full) 25

r	mod	theta/pi	#sts
03	1.000000000	0.250000000	8
04	0.707106781	0.375000000	132
05	1.650335359	0.913081267	744
06	1.000000000	-0.500000000	4505
07	0.736976229	0.678571429	17048
08	1.155762276	0.477941752	64912
09	2.577402769	-0.978810815	188616
10	2.131112570	-0.279344013	545353
11	1.373116949	-0.222968290	1322600
12	2.732050808	0.208333333	3186596

gem: dabcgefjhimklonqpsr
jrpedkmgoafchlsnbqi
h0 v38 lormkqacpejgdfbishn

U[2052] edges: 9 blocks: 3 orient: +

9_{188} (0) 10^1 2 blinks

$r_?^{40}$ #ts(full) 156

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	0.923879533	1.000000000	42
05	0.000000000	0.000000000	160
06	0.788675135	0.000000000	637
07	0.000000000	0.000000000	1904
08	1.261284216	0.729115361	5284
09	0.000000000	0.000000000	12772
10	1.581138830	-0.602416382	28881
11	0.000000000	0.000000000	60016
12	1.888625382	-0.022016502	118422

gem: dabcgefjhimklpnorqts
jnledshgqapcbmitofrk
h0 v40 oeihtanqcsjgrlfdpmkb

U[2055] edges: 9 blocks: 4 orient: +

U[2063] edges: 9 blocks: 4 orient: +

9_{189} (0) 2^1 2 blinks

$r_?^{38}$ #ts(full) 740

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	0.923879533	-0.500000000	42
05	0.000000000	0.000000000	160
06	0.788675135	1.000000000	637
07	0.000000000	0.000000000	1904
08	0.822571766	0.154326672	5284
09	0.000000000	0.000000000	12772
10	0.502778683	0.733480848	28881
11	0.000000000	0.000000000	60016
12	1.131088383	-0.443964279	118422

gem: dabcgefjhimklonqpsr
jolpdkrgmasqnibechf
h0 v38 oshlqibmfpjdckrneag

U[2059] edges: 9 blocks: 4 orient: +

U[2065] edges: 9 blocks: 4 orient: +

9_{190} (0) 3^2 1 blinks

$r_?^{44}$ #ts(partial) 466

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	142
05	0.798872081	0.545931659	536
06	0.866025404	0.000000000	3575
07	0.558632095	-0.545883677	10988
08	1.497904681	1.000000000	40836
09	0.895842943	0.511788960	103452
10	0.638196601	0.908136683	283977
11	1.327906701	0.828605733	620752
12	2.144873177	0.404488201	1412938

gem: dabcgefjhimklpnorqtsvu
jsnvdkrgtapucmbfohqile
h0 v44 tgqnlobspkjiaurecfvmdh

U[2060] edges: 9 blocks: 2 orient: +

9_{191} (0) 3^2 1 blinks

$r_?^{36}$ #ts(full) 10

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	142
05	1.279920545	0.089085396	536
06	0.866025404	0.000000000	3575
07	0.859701243	0.067643930	10988
08	1.880588113	0.000000000	40836
09	1.674077232	-0.138807319	103452
10	1.638196601	-0.178170792	283977
11	2.384681887	-0.262396676	620752
12	2.144873177	-0.404488201	1412938

gem: dabcgefjhimklpnorq
joqedclgkpihrmbafn
h0 v36 hprgcldnfkjiqamboe

9_{192} (0) 3^2 1 blinks

$r_?^{40}$ #ts(full) 426

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	46
05	1.203001910	0.200000000	248
06	0.866025404	0.000000000	1247
07	0.753041503	-0.285714286	4136
08	0.191341716	0.000000000	14132
09	0.793023581	-0.239347160	36864
10	1.447213595	-0.400000000	97117
11	1.149245400	-0.609000108	215724
12	0.683012702	-0.500000000	480058

gem: dabcgefjhimklpnorqts
jmredqsgkaitplfbochn
h0 v40 mlhjkrbcfongaedsptqi

U[2066] edges: 9 blocks: 2 orient: +

9_{193} (1) 3^1 6 blinks

$r_?^{38}$ #ts(full) 2

r	mod	theta/pi	#sts
03	1.000000000	-0.500000000	4
04	0.000000000	0.000000000	46
05	1.175570505	1.000000000	248
06	1.000000000	0.333333333	1247
07	0.801937736	0.785714286	4136
08	1.732050808	-0.070913276	14132
09	1.595818538	-0.854183441	36864
10	0.381966011	-0.400000000	97117
11	1.425885328	0.661119362	215724
12	1.732050807	-0.250000000	480058

gem: dabchefgkijnlmqopsr
komedclshraqfbnjgpi
h0 v38 jgplsqbarhdkoemcfin

U[2068] edges: 9 blocks: 2 orient: +

U[2891] edges: 9 blocks: 3 orient: +

U[2314] edges: 9 blocks: 3 orient: -

U[3382] edges: 9 blocks: 3 orient: -

U[2809] edges: 9 blocks: 2 orient: -

U[3408] edges: 9 blocks: 2 orient: -

9_{194} (1) 3^1 3 blinks

$r_?^{42}$ #ts(full) 2

r	mod	theta/pi	#sts
03	1.000000000	-0.500000000	4
04	0.000000000	0.000000000	46
05	0.381966011	-0.100000000	248
06	1.000000000	0.666666667	1247
07	2.211353372	-0.472169585	4136
08	1.732050808	0.679086724	14132
09	1.441778656	-0.038430618	36864
10	1.561311660	0.754068341	97117
11	1.556680729	-0.540531415	215724
12	1.732050807	0.250000000	480058

gem: dabcgefjhimklpnorqtsvu
josudphgfavcqmtinlrbek
h0 v44 qhnpkuomtejgbcldsfavri

U[2069] edges: 9 blocks: 2 orient: +

U[2305] edges: 9 blocks: 3 orient: +

U[3377] edges: 9 blocks: 3 orient: +

9_{195} (0) 2^1 1 blinks

$r_?^{42}$ #ts(full) 7

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	0.382683432	0.000000000	30
05	0.000000000	0.000000000	112
06	0.211324865	0.000000000	421
07	0.000000000	0.000000000	1224
08	0.137949690	0.500000000	3332
09	0.000000000	0.000000000	7924
10	1.251853814	-0.460949838	17745
11	0.000000000	0.000000000	36528
12	0.200809997	-0.336982751	71666

gem: dabcgefjhimklpnosqrut
juskdpogqaecrmhftnlib
h0 v42 qkirctpmebjnulasodgfh

U[2072] edges: 9 blocks: 3 orient: +

9_{196} (0) 6 blinks

$r_?^{42}$ #ts(full) 1

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	42
05	0.798872081	-0.454068341	160
06	0.288675135	0.000000000	637
07	0.210928687	-0.384973272	1904
08	0.574025149	1.000000000	5284
09	0.530873376	-0.881393180	12772
10	0.638196601	0.908136683	28881
11	0.173442465	0.855274413	60016
12	0.333576802	-0.244881019	118422

gem: dabchefgkijnlmqopsrut
krnedcmphosbqfuigtalj
h0 v42 enqfidpuatlkrbmgcojsh

U[2089] edges: 9 blocks: 2 orient: +

U[2426] edges: 9 blocks: 1 orient: +

U[2129] edges: 9 blocks: 1 orient: +

U[2873] edges: 9 blocks: 1 orient: +

U[2245] edges: 9 blocks: 1 orient: +

U[3092] edges: 9 blocks: 1 orient: +

9_{197} (1) 3 blinks

$r_?^{46}$ #ts(full) 148

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	4
04	1.000000000	1.000000000	46
05	1.236067978	1.000000000	160
06	1.000000000	0.000000000	693
07	1.603875472	-0.087196313	1916
08	1.000000000	-0.500000000	5560
09	0.448436333	-0.529777184	12820
10	1.266837942	0.270299312	29725
11	1.045718043	0.566083372	59960
12	1.239313675	-0.798855427	120222

gem: dabcgefjhimklpnosqrutwv
jnrwdvmgtaquhsikpfbolce
h0 v46 qtioakupcfjsvmrhedwbgnl

U[2105] edges: 9 blocks: 1 orient: +

U[2978] edges: 9 blocks: 1 orient: -

U[3081] edges: 9 blocks: 2 orient: +

9_{198} (0) 4^1 3 blinks

$r_?^{44}$ #ts(full) 3

r	mod	theta/pi	#sts
03	1.000000000	-0.250000000	4
04	0.707106781	-0.875000000	24
05	1.019963345	0.613081267	108
06	0.577350269	0.333333333	373
07	0.626986706	-0.407171361	1160
08	0.240024675	-0.518826703	3120
09	0.176994028	-0.731741997	7612
10	0.480422450	-0.584289187	17033
11	0.120592553	-0.607749288	35540
12	0.570467044	-0.224137481	69780

gem: dabcgefjhimklpnorqtsvu
jspedqlgtabhumvrockinf
h0 v44 rptlknausejqcfibdgovhm

U[2803] edges: 9 blocks: 1 orient: +

U[2998] edges: 9 blocks: 1 orient: -

9_{199} (0) 3 blinks

$r_?^{46}$ #ts(full) 2

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	42
05	0.141995114	-0.200000000	160
06	0.288675135	0.000000000	637
07	0.414566728	0.360635685	1904
08	0.349854384	0.000000000	5284
09	0.109759133	-0.195676243	12772
10	0.020162612	0.400000001	28881
11	0.138394539	-0.368826858	60016
12	0.606725372	0.018844586	118422

gem: dabcgefjhimklpnosqrutwv
jwredcmgtaqohsukpfbvlin
h0 v46 vlufhwtpsrjbnmaegkiqcod

U[2125] edges: 9 blocks: 1 orient: +

U[2165] edges: 9 blocks: 1 orient: +

U[3089] edges: 9 blocks: 1 orient: +

9_{200} (1) 1 blinks

$r_?^{44}$ #ts(full) 2

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	4
04	1.000000000	0.000000000	42
05	1.328131026	-0.054068341	148
06	0.000000000	0.000000000	597
07	0.280102340	-0.242116129	1664
08	0.414213562	1.000000000	4616
09	2.536832184	0.598601736	10720
10	2.085071739	0.365658810	24125
11	2.563787079	0.190090866	48980
12	2.732050808	0.000000000	96186

gem: dabcgefjhimklpnorqtsvu
jroednhglspqfmcutvaikb
h0 v44 tfiqnusmcvjerlgdphoabk

U[2143] edges: 9 blocks: 1 orient: +

9_{201} (0) 4 blinks

$r_?^{58}$ #ts(full) 8

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	1.000000000	34
05	0.620409298	-0.973504147	74
06	0.288675135	0.000000000	335
07	0.205116335	-0.966824792	722
08	0.191341716	0.500000000	2020
09	0.436202602	0.396722410	3940
10	0.384907697	-0.052991707	8689
11	0.136142113	0.201366962	15446
12	0.557447147	0.807469377	29406

gem: dabchefgkijnlmqoptrswuvzxyBADC
kqfedcrzhyajxAnDsgbCtoBwlivmup
h0 v60 BgmpxtjACbfkuDezwqvlcsrohdyain

U[2145] edges: 9 blocks: 1 orient: +

U[2246] edges: 9 blocks: 1 orient: +

U[2831] edges: 9 blocks: 1 orient: -

U[3105] edges: 9 blocks: 1 orient: +

9_{202} (0) 4^1 1 blinks

$r_?^{42}$ #ts(full) 1

r	mod	theta/pi	#sts
03	1.000000000	0.250000000	4
04	0.707106781	0.375000000	70
05	0.811393378	-0.974367653	232
06	0.577350269	0.333333333	1221
07	1.329887483	0.604368206	3236
08	1.398966326	0.606173297	10504
09	1.439826155	-0.777913135	23404
10	1.072452927	-0.363081267	58285
11	0.582393432	-0.684828375	114416
12	1.388906894	0.726069656	240918

gem: eabcdifghljkomnqpsrut
itmqfepjuogclshkdbnra
h0 v42 tkhgmpncjibusdfolqear

U[2168] edges: 9 blocks: 1 orient: +

9_{203} (1) 5^1 2 blinks

$r_?^{48}$ #ts(full) 66

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	4
04	1.000000000	-0.500000000	38
05	1.236067978	-0.200000000	148
06	1.000000000	-0.666666667	573
07	1.970749326	-0.310751242	1728
08	0.171572875	-0.750000000	4768
09	1.734384781	-0.240807345	11496
10	1.850550860	0.361286386	25997
11	0.084014899	0.116315942	53964
12	1.743122421	0.425938670	106334

gem: dabchefgkijnlmqoptrsvuxw
kvmedclihxstfonbrquwapgj
h0 v48 tguilobsxpekhrvjcwmaqfnd

U[2170] edges: 9 blocks: 1 orient: +

U[2825] edges: 9 blocks: 1 orient: +

9_{204} (0) 4^1 3 blinks

$r_?^{48}$ #ts(full) 2

r	mod	theta/pi	#sts
03	1.000000000	-0.250000000	4
04	0.707106781	0.625000000	38
05	0.431535930	0.195931659	144
06	0.577350269	-0.333333333	593
07	1.537431952	0.031961316	1732
08	1.772963136	-0.085083618	4964
09	0.714897633	-0.210813486	11780
10	0.229593316	0.032920077	27245
11	1.528739936	0.506965468	55864
12	1.832987446	0.261156048	112002

gem: dabcgefjhimklpnosqrutwvyx
jwnldthgrapecmxuoifskqyvb
h0 v50 rhyscxubpvjofatwgndlqkime

U[2188] edges: 9 blocks: 1 orient: +

U[2380] edges: 9 blocks: 1 orient: -

U[2682] edges: 9 blocks: 1 orient: +

9_{205} (0) 4 blinks

$r_?^{46}$ #ts(full) 1

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	42
05	0.459505841	0.200000000	160
06	0.288675135	0.000000000	637
07	0.293284091	-0.696930422	1904
08	0.032829048	0.000000000	5284
09	0.274808309	0.747635221	12772
10	0.211145618	-0.400000000	28881
11	0.332412210	0.685480426	60016
12	0.807453614	0.257892873	118422

gem: dabcgefjhimklpnosqrutwv
jrqedtoglwsinmhupbvfcka
h0 v46 seniuarqvpjogctkwmflbdh

U[2221] edges: 9 blocks: 1 orient: +

U[2376] edges: 9 blocks: 1 orient: +

U[2495] edges: 9 blocks: 1 orient: +

U[2756] edges: 9 blocks: 1 orient: -

9_{206} (2) 1 blinks

$r_?^{44}$ #ts(full) 4

r	mod	theta/pi	#sts
03	1.414213562	0.000000000	8
04	0.000000000	0.000000000	66
05	1.027486297	0.600000000	344
06	1.732050808	0.333333333	1483
07	2.713791736	0.384973272	5264
08	4.000000000	0.375000000	16196
09	2.415771745	0.260652840	44304
10	1.318188449	0.675632347	109933
11	4.615418264	0.530504058	251944
12	6.324555320	0.397583618	539078

gem: dabchefgkijnlmqoptrsvu
konedurihpasfvtjgqlbmc
h0 v44 pgfvosbaqulktenhdjcmri

U[2279] edges: 9 blocks: 1 orient: +

9_{207} (1) 1 blinks

$r_?^{44}$ #ts(full) 234

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	8
04	1.000000000	0.000000000	76
05	0.381966011	-0.600000000	416
06	1.000000000	0.000000000	1875
07	1.685575984	-0.029283938	6760
08	3.000000000	0.000000000	21160
09	1.486215304	-0.142368331	58248
10	1.096187084	-0.134341190	145685
11	0.957306983	-0.332193976	334928
12	3.088024997	-0.076184182	719652

gem: dabcgefjhimklpnorqtsvu
gusldqapbrjenmctvkohif
h0 v44 vskoqcmglafthrdepubinj

U[2282] edges: 9 blocks: 1 orient: +

9_{208} (1) 3^1 2 blinks

$r_?^{46}$ #ts(full) 7

r	mod	theta/pi	#sts
03	1.000000000	-0.500000000	4
04	0.000000000	0.000000000	54
05	0.381966011	0.700000000	184
06	1.000000000	0.666666667	869
07	1.847588408	0.119686036	2364
08	0.414213562	-0.625000000	7224
09	0.820639567	-0.964085159	16436
10	1.121318070	0.375632347	39405
11	1.265401156	0.765928437	78624
12	1.239313675	0.048855427	161318

gem: eabcdifghljkomnrpqustwv
iwoqfepktbumlgrndcvahsj
h0 v46 khgoswcbjiarfqteuvpdnlm

U[2286] edges: 9 blocks: 1 orient: +

U[2808] edges: 9 blocks: 2 orient: +

9_{209} (0) 6^1 2 blinks

$r_?^{42}$ #ts(full) 17

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	0.923879532	-0.250000000	42
05	0.000000000	0.000000000	160
06	0.707106781	-0.750000000	637
07	0.000000000	0.000000000	1904
08	0.606602033	0.493499808	5284
09	0.000000000	0.000000000	12772
10	0.809380752	0.109543578	28881
11	0.000000000	0.000000000	60016
12	1.911175423	-0.827706474	118422

gem: dabcgefjhimklpnosqrut
jrpodstgumifaqecnblhk
h0 v42 sfnjuoalqdphcmbtikgre

U[2303] edges: 9 blocks: 3 orient: +

U[3202] edges: 9 blocks: 2 orient: +

9_{210} (0) 6^1 2 blinks

$r_?^{38}$ #ts(full) 1120

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	0.923879532	-0.750000000	42
05	0.000000000	0.000000000	160
06	0.707106781	0.250000000	637
07	0.000000000	0.000000000	1904
08	0.847242829	-0.563482682	5284
09	0.000000000	0.000000000	12772
10	0.848169152	0.472294042	28881
11	0.000000000	0.000000000	60016
12	1.385835736	-0.251550356	118422

gem: dabcgefjhimklonqpsr
jkfrdsogqabipmhnlec
h0 v38 ephoadrmbsjnclfigqk

U[2310] edges: 9 blocks: 3 orient: +

U[3198] edges: 9 blocks: 2 orient: -

9_{211} (0) 2^2 1 blinks

$r_?^{40}$ #ts(full) 572

r	mod	theta/pi	#sts
03	1.414213562	0.000000000	8
04	0.707106781	0.250000000	124
05	2.406003820	0.200000000	768
06	2.081665999	-0.077210479	4257
07	1.831544142	0.079412550	17352
08	3.470287195	-0.182299164	62440
09	1.982960341	-0.432886658	190664
10	2.933749882	-0.335791136	530497
11	3.729801371	-0.681044600	1331904
12	1.591443392	-0.790940332	3122028

gem: dabcgefjhimklpnorqts
jonqdtkgpahscmbielrf
h0 v40 nshmlqdcbpjegtfrokia

U[2315] edges: 9 blocks: 2 orient: +

9_{212} (0) 10^1 1 blinks

$r_?^{44}$ #ts(full) 1

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	0.382683432	0.500000000	46
05	0.000000000	0.000000000	184
06	0.211324865	1.000000000	789
07	0.000000000	0.000000000	2360
08	0.057140632	0.250000000	6876
09	0.000000000	0.000000000	16496
10	0.937191343	-0.265323473	38465
11	0.000000000	0.000000000	79336
12	0.034869635	0.115711991	159786

gem: dabcgefjhimklpnosqrutwv
jurwdqognasbtmhfpvkilce
h0 v46 soiqchtfenjwukbvdglrmpa

9_{213} (0) 6^1 2 blinks

$r_?^{42}$ #ts(full) 3

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	0.382683432	-0.750000000	46
05	0.000000000	0.000000000	184
06	0.366025404	0.500000000	789
07	0.000000000	0.000000000	2360
08	0.429037164	0.979198174	6876
09	0.000000000	0.000000000	16496
10	0.992606536	-0.056801149	38465
11	0.000000000	0.000000000	79336
12	0.735162199	-0.550886540	159786

gem: dabchefgkijnlmqopsrut
krfedctmhpaqignslujob
h0 v42 uosnpljrcgfktdbahqime

U[2322] edges: 9 blocks: 1 orient: +

U[2674] edges: 9 blocks: 1 orient: +

9_{214} (0) 3^2 1 blinks

$r_?^{52}$ #ts(full) 49

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	40
05	0.459505841	0.800000000	156
06	0.866025404	0.000000000	581
07	0.850771123	0.173094520	1780
08	1.273733916	0.000000000	4772
09	1.008866792	0.444444444	11640
10	0.211145618	0.400000000	25913
11	1.496558297	0.305138984	54020
12	1.199164220	-0.052302341	105676

gem: dabchefgjimklpnosqrvtuxwzy
jwrzdyqihostxmagpfulkbvnce
h0 v52 wjpruiaxfnhdybeczltsomgkvq

U[2425] edges: 9 blocks: 1 orient: +

9_{215} (0) 7^1 1 blinks

$r_?^{52}$ #ts(full) 6

r	mod	theta/pi	#sts
03	0.707106781	0.500000000	4
04	0.500000000	-0.750000000	40
05	1.061006796	0.300000000	156
06	0.288675135	0.000000000	581
07	0.329438574	0.261543466	1780
08	1.339392013	0.875000000	4772
09	1.039188375	-0.128199185	11640
10	1.125735421	0.400000000	25913
11	1.731256771	0.985918794	54020
12	0.501344437	0.655200038	105676

gem: dabchefgkijnlmporqustxvwzy
kwvrdqunhyagticfpeozlsbjxm
h0 v52 wgjuvmrypcqkfonslbiextzdha

U[2429] edges: 9 blocks: 1 orient: +

9_{216} (1) 2 blinks

$r_?^{48}$ #ts(full) 381

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	4
04	1.000000000	1.000000000	46
05	1.773667960	0.865658810	188
06	0.000000000	0.000000000	765
07	1.761727968	-0.407487549	2368
08	1.585786438	-0.500000000	6668
09	1.065604270	0.613021874	16296
10	3.206031885	0.230853420	37237
11	1.522706442	-0.236365284	77884
12	3.105828541	0.916666667	154394

gem: dabcgefjhimklpnosqrvtuxw
jwmedcpgsabuflqhotxrnkvi
h0 v48 lfhmwnscprjqdbxvakuogiet

U[2457] edges: 9 blocks: 1 orient: +

U[2702] edges: 9 blocks: 1 orient: -

9_{217} (0) 6^1 2 blinks

$r_?^{36}$ #ts(full) 644

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	0.923879532	0.250000000	22
05	0.000000000	0.000000000	80
06	0.707106781	0.250000000	255
07	0.000000000	0.000000000	680
08	0.392847479	0.375000000	1648
09	0.000000000	0.000000000	3588
10	0.515308013	0.577780747	7309
11	0.000000000	0.000000000	13896
12	0.866025404	0.570913276	25158

gem: dabcgefjhimklpnorq
jrmpdohgfabqclienk
h0 v36 nfhqiblpekjgamdroc

U[2515] edges: 9 blocks: 5 orient: +

U[2520] edges: 9 blocks: 3 orient: -

9_{218} (1) 3^1 3 blinks

$r_?^{32}$ #ts(full) 9

r	mod	theta/pi	#sts
03	1.000000000	0.500000000	4
04	0.000000000	0.000000000	22
05	0.000000000	0.000000000	80
06	1.000000000	-0.333333333	255
07	1.414213562	-0.027830415	680
08	1.000000000	0.375000000	1648
09	1.000000000	-0.944444444	3588
10	1.000000000	-0.600000000	7309
11	1.000000000	-0.590909091	13896
12	1.000000000	-0.250000000	25158

gem: dabcgefjhilknmpo
jpkedchglnfoiamb
h0 v32 fkimnloecbjaphgd

U[2518] edges: 9 blocks: 5 orient: +

U[2595] edges: 9 blocks: 4 orient: -

U[3420] edges: 9 blocks: 5 orient: +

9_{219} (0) 5^1 1 blinks

$r_?^{42}$ #ts(partial) 382

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	-0.500000000	34
05	0.831253875	-0.400000000	66
06	0.288675135	1.000000000	309
07	0.634884924	0.806478430	552
08	0.461939766	-0.750000000	1576
09	0.232457745	0.794902716	2600
10	0.690983006	0.800000000	5725
11	1.109859440	0.850619938	8850
12	0.734490785	0.419842373	16626

gem: dabcgefjhimklpnosqrut
jumndprgqaticelsohfkb
h0 v42 fhqtiakpegjdsmrbuonlc

9_{220} (0) 4^1 1 blinks

$r_?^{46}$ #ts(partial) 805

r	mod	theta/pi	#sts
03	1.000000000	0.250000000	4
04	0.707106781	0.375000000	30
05	1.019963345	0.986918733	104
06	0.577350269	-0.333333333	367
07	0.234113181	0.107142857	960
08	0.478732409	0.647058248	2440
09	0.404462082	0.702360710	5248
10	1.102453112	-0.570969760	10997
11	0.693004972	-0.035005274	20712
12	1.042990097	0.524377002	38206

gem: dabcgefjhimklpnosqrutwv
jrpedvognsbtimhwluaqkfc
h0 v46 nihmloscbvjprwteudgfqka

U[2560] edges: 9 blocks: 1 orient: +

9_{221} (0) 12^1 1 blinks

r_{402}^{28} #ts(full) 2

r	mod	theta/pi	#sts
03	1.000000000	-0.250000000	8
04	0.707106781	-0.875000000	48
05	1.312862063	0.725632347	216
06	1.000000000	0.500000000	785
07	0.182018097	0.464285714	2416
08	0.500000000	-0.437500000	6528
09	1.527525232	-0.643852192	15888
10	1.283438193	-0.934341190	35505
11	0.605987289	0.300918624	73912
12	1.414213562	-0.125000000	144944

gem: dabcgefjhilknm
jnledchgkamfib
h0 v28 mkigchdnebjalf

U[2602] edges: 9 blocks: 5 orient: +

9_{222} (0) 12^1 1 blinks

r_6^{26} #ts(full) 4

r	mod	theta/pi	#sts
03	1.000000000	0.250000000	8
04	0.707106781	0.375000000	48
05	0.324919696	-0.650000000	216
06	1.000000000	-0.500000000	785
07	1.460870634	-0.478089655	2416
08	1.118033989	-0.460083618	6528
09	0.577350269	-0.583333333	15888
10	0.552786404	0.800000000	35505
11	1.099100659	0.708491042	73912
12	1.414213562	0.625000000	144944

gem: cabfdeighkjml
imdcbgflkhaje
h0 v26 gfmaibdklchej

U[2603] edges: 9 blocks: 5 orient: +

9_{223} (0) 3 blinks

$r_?^{54}$ #ts(full) 3

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	1.000000000	18
05	0.655738262	0.600000000	38
06	0.288675135	0.000000000	125
07	0.502701649	-0.501028004	254
08	0.732537816	0.500000000	580
09	0.832081162	0.488319191	1060
10	0.429992669	0.800000000	2021
11	1.002532791	-0.928926146	3374
12	0.524969489	0.917857192	5734

gem: dabchefgkijnlmqoptrsvuxwzyBA
hszwdxjuqgfkAynrvpbatieloBmc
h0 v56 jBgyloqAhamukwftcevzrnsdxpib

U[2650] edges: 9 blocks: 1 orient: +

U[3002] edges: 9 blocks: 1 orient: -

U[3059] edges: 9 blocks: 1 orient: +

9_{224} (0) 6^1 1 blinks

$r_?^{48}$ #ts(full) 97

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	0.923879532	0.250000000	26
05	0.000000000	0.000000000	96
06	0.366025404	-0.500000000	315
07	0.000000000	0.000000000	856
08	0.711835552	0.535753980	2096
09	0.000000000	0.000000000	4612
10	0.510411424	-0.665510018	9449
11	0.000000000	0.000000000	18072
12	0.284759469	-0.382745168	32834

gem: dabcgefjhimklpnosqrvtuxw
jvsedclgtaphrmxuwnfikoqb
h0 v48 lgohkuwmnejadvcxpftsribq

U[2671] edges: 9 blocks: 1 orient: +

9_{225} (0) 5^1 3 blinks

$r_?^{52}$ #ts(full) 2

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	-0.500000000	18
05	0.317510727	-0.400000000	42
06	0.288675135	1.000000000	141
07	0.764718650	0.785339258	294
08	0.620452434	0.250000000	696
09	0.387098972	-0.018800542	1272
10	0.100813062	0.800000000	2493
11	0.671117687	0.917165789	4150
12	0.426996750	0.682881741	7186

gem: dabcgefjhimklpnosqrvtuywxAz
jumpdzhgsvbyclxefwirkatAnqo
h0 v54 qlyxhmreukjzosfapvndwgAtcbi

U[2749] edges: 9 blocks: 1 orient: +

U[2847] edges: 9 blocks: 1 orient: -

U[3014] edges: 9 blocks: 1 orient: -

9_{226} (0) 4^1 1 blinks

$r_?^{50}$ #ts(partial) 649

r	mod	theta/pi	#sts
03	1.000000000	-0.250000000	4
04	0.707106781	-0.875000000	30
05	1.192598523	-0.866570011	104
06	0.577350269	1.000000000	367
07	0.611980236	0.316196143	960
08	0.191824306	0.664916382	2440
09	0.550390882	-0.730345018	5248
10	0.140214523	0.854068341	10997
11	1.012450225	0.320478828	20712
12	0.253231689	0.310749716	38206

gem: dabcgefjhimklpnosqrutwvyx
jykvdphgurwxsmitlanfoecqb
h0 v50 wmntkiqayejobulgpvdscrxhf

9_{227} (0) 9^1 2 blinks

$r_?^{50}$ #ts(partial) 76

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	1.000000000	34
05	0.721222998	0.763081267	66
06	0.500000000	-0.500000000	309
07	1.038587383	-0.392757035	552
08	0.349854384	0.500000000	1576
09	0.883511382	0.449780422	2600
10	0.520162612	0.473837466	5725
11	0.574500931	0.862200667	8850
12	0.306449158	-0.429853662	16626

gem: dabchefgkijnlmqopsrutxvwzy
kjuedctzhqaiyvnxbpgsfomrwl
h0 v52 qzjrnkbuwcfpoxdltmvyhsieag

U[2842] edges: 9 blocks: 3 orient: +

U[3291] edges: 9 blocks: 2 orient: -

9_{228} (0) 2^1 1 blinks

$r_?^{42}$ #ts(full) 135

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	0.923879533	-0.500000000	26
05	0.000000000	0.000000000	84
06	0.788675135	1.000000000	275
07	0.000000000	0.000000000	696
08	1.137515221	0.181321079	1684
09	0.000000000	0.000000000	3576
10	0.745030197	-0.711398553	7253
11	0.000000000	0.000000000	13596
12	0.720274043	0.809636397	24526

gem: dabcgefjhimklonqpsrut
jkpndqmglurthecosbfia
h0 v42 rhlusciopkjfnmbgaqted

U[2860] edges: 9 blocks: 3 orient: +

9_{229} (0) 2^1 1 blinks

$r_?^{44}$ #ts(full) 2

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	0.923879533	0.500000000	26
05	0.000000000	0.000000000	84
06	0.788675135	1.000000000	275
07	0.000000000	0.000000000	696
08	1.419407413	-0.750000000	1684
09	0.000000000	0.000000000	3576
10	0.902438691	-0.651062475	7253
11	0.000000000	0.000000000	13596
12	0.462043211	-0.300837241	24526

gem: eabcdhfgkijnlmporqtsvu
kvnpsetohlauicmrgdfqjb
h0 v44 mgoinjpsdvqkteublhracf

U[2861] edges: 9 blocks: 3 orient: +

9_{230} (0) 1 blinks

$r_?^{60}$ #ts(partial) 687

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	1.000000000	18
05	0.901087498	-0.059309062	36
06	0.288675135	0.000000000	119
07	1.442404911	0.625675138	232
08	1.273733916	0.500000000	522
09	1.001758242	0.336921756	942
10	0.811958680	0.118618124	1761
11	0.723786542	0.188240281	2932
12	0.728150448	0.233117237	4904

gem: dabchefgkijnlmqoptrsvuxwAyzDBC
kzqCdBrohmAbuintDgfpjwvyxlasec
h0 v60 wosnxjADcylkedvazqiutbCmfrBgph

U[2863] edges: 9 blocks: 2 orient: +

9_{231} (0) 3^2 1 blinks

$r_?^{40}$ #ts(partial) 1340

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	40
05	0.371748034	0.600000000	140
06	0.866025404	0.000000000	515
07	0.521120889	-0.428571429	1376
08	0.732537816	1.000000000	3504
09	0.550031434	0.222222222	7680
10	0.138196601	0.800000000	16005
11	0.484450781	0.526968265	30580
12	1.183012702	0.000000000	56056

gem: dabchefgkijmlpnorqts
knqedsjihgarbmftploc
h0 v40 lkoqrjsdatpigecbhnmf

U[2878] edges: 9 blocks: 4 orient: +

9_{232} (1) 1 blinks

$r_?^{42}$ #ts(full) 6

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	4
04	0.000000000	0.000000000	30
05	0.381966011	0.000000000	96
06	1.000000000	-0.333333333	339
07	2.211353372	-0.543598157	852
08	1.732050807	-0.445913276	2156
09	1.441778656	-0.205097284	4548
10	1.561311660	-0.445931659	9493
11	1.556680729	-0.767804142	17688
12	1.732050808	1.000000000	32538

gem: dabcgefjhimklpnosqrut
jkpsdrtgnlbaimucofehq
h0 v42 niqfuocrbpjetadkghmsl

U[2892] edges: 9 blocks: 3 orient: +

9_{233} (1) 1 blinks

$r_?^{42}$ #ts(full) 13

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	4
04	1.000000000	1.000000000	46
05	1.618033989	0.600000000	152
06	0.000000000	0.000000000	623
07	1.305412983	0.904400608	1580
08	0.414213562	0.500000000	4308
09	1.969615506	-0.833333333	9084
10	1.902113033	0.700000000	19809
11	1.511499149	-0.681818182	36784
12	2.732050807	0.833333333	69610

gem: dabcgefjhimklpnosqrut
mnstduhgfkjqobalpicer
h0 v42 qufhickreopbtmjgadnsl

9_{234} (0) 2^1 1 blinks

$r_?^{46}$ #ts(partial) 241

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	0.923879533	0.500000000	46
05	0.000000000	0.000000000	152
06	0.211324865	0.000000000	623
07	0.000000000	0.000000000	1580
08	0.243531811	-0.750000000	4308
09	0.000000000	0.000000000	9084
10	0.475589268	-0.126938629	19809
11	0.000000000	0.000000000	36784
12	1.111321437	0.368661357	69610

gem: dabcgefjhimklpnosqrutwv
juredqoglvsinmhfpctwbak
h0 v46 srfkonbmtdjpwceuigaqvlh

U[2920] edges: 9 blocks: 2 orient: +

9_{235} (0) 9^1 1 blinks

$r_?^{40}$ #ts(full) 26

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	0.000000000	34
05	0.721222998	-0.436918733	66
06	0.500000000	-0.500000000	309
07	0.356635209	-0.125059328	552
08	0.349854384	1.000000000	1576
09	0.559179085	0.864590553	2600
10	0.520162612	0.873837466	5725
11	0.839330478	-0.777705441	8850
12	0.211832436	-0.102416382	16626

gem: dabcgefjhimklpnorqts
jsmldqhgtanrckbfpeoi
h0 v40 otlgknpmsejcbfrdiaqh

U[2940] edges: 9 blocks: 1 orient: +

9_{236} (0) 1 blinks

$r_?^{36}$ #ts(full) 3

U[2942] edges: 9 blocks: 1 orient: +

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	30
05	0.573741760	0.275632347	104
06	0.288675135	0.000000000	367
07	0.633550928	0.696232452	960
08	0.349854384	1.000000000	2440
09	0.736968957	-0.986325015	5248
10	0.329179607	-0.551264694	10997
11	0.763041929	-0.276851676	20712
12	0.692874907	0.291171725	38206

gem: cabfdeighljkomnrpq
irqcplfkmnhgajeodb
h0 v36 kqhpjboneirmlcgdfa

9_{237} (1) 1 blinks

$r_?^{38}$ #ts(full) 1

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	4
04	1.000000000	0.000000000	40
05	0.618033989	0.200000000	140
06	1.000000000	0.000000000	515
07	0.445041868	-0.142857143	1376
08	0.414213562	1.000000000	3504
09	0.652703645	0.444444444	7680
10	0.618033989	0.600000000	16005
11	0.839037352	0.563545563	30580
12	1.505971179	0.361688385	56056

gem: dabchefgkijnlmqopsr
kjledrpihmasbongfqc
h0 v38 jsgqmpobnadkercflih

U[2950] edges: 9 blocks: 1 orient: +

9_{238} (0) 1 blinks

$r_?^{42}$ #ts(full) 277

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	26
05	0.798872081	-0.054068341	96
06	0.288675135	0.000000000	315
07	0.371971784	0.372910599	856
08	0.191341716	0.000000000	2096
09	0.565823675	-0.097891367	4612
10	0.638196601	0.108136683	9449
11	0.652254779	-0.204462090	18072
12	1.092784174	-0.151271810	32834

gem: dabcgefjhimklpnosqrut
juprdnhglabtfmqsoecik
h0 v42 ofekcbrmpdjgutsinlaqh

U[2952] edges: 9 blocks: 1 orient: +

9_{239} (0) 5^1 2 blinks

$r_?^{48}$ #ts(full) 16

U[2968] edges: 9 blocks: 1 orient: +

U[3214] edges: 9 blocks: 1 orient: -

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	0.500000000	34
05	0.580414541	0.954068341	66
06	0.288675135	1.000000000	309
07	0.711155743	0.296403872	552
08	0.303427098	0.750000000	1576
09	0.601823105	-0.961310678	2600
10	0.336881039	0.091863317	5725
11	0.322398244	-0.942356426	8850
12	0.296261356	-0.140292676	16626

gem: dabcgefjhimklpnosqrvtuxw
jxuqdmhglwspfkbietvrcnao
h0 v48 shlnocwmaxjfbdetpviqgruk

9_{240} (0) 11^1 1 blinks

$r_?^{38}$ #ts(partial) 747

r	mod	theta/pi	#sts
03	0.707106781	-0.500000000	4
04	0.500000000	-0.750000000	30
05	0.573741760	0.775632347	112
06	0.288675135	1.000000000	421
07	0.392119039	0.838488000	1224
08	0.079256334	0.875000000	3332
09	0.545448276	0.087791193	7924
10	0.329179607	-0.551264694	17745
11	0.358052662	0.847264730	36528
12	0.739637029	0.750000000	71666

gem: dabcgefjhimklonqpsr
jimedpsgkabrqlfocnh
h0 v38 pflihbaoqrjsnmegdkc

9_{241} (0) 6^1 1 blinks

$r_?^{40}$ #ts(full) 186

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	0.382683432	-0.250000000	38
05	0.000000000	0.000000000	120
06	0.707106781	0.250000000	467
07	0.000000000	0.000000000	1156
08	0.398298698	-0.131423364	3084
09	0.000000000	0.000000000	6420
10	0.672406094	-0.866882449	13845
11	0.000000000	0.000000000	25520
12	0.150874815	0.676051343	47986

gem: dabcgefjhimklpnorqts
jrpodthgmafsqlecibnk
h0 v40 fkiprlsmnbjaecqtohgd

U[3024] edges: 9 blocks: 3 orient: +

9_{242} (0) 1 blinks

$r_?^{38}$ #ts(full) 2

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	40
05	0.798872081	0.054068341	140
06	0.288675135	0.000000000	515
07	0.459724481	0.271910345	1376
08	0.732537816	0.000000000	3504
09	0.815492571	-0.156597184	7680
10	0.638196601	-0.108136683	16005
11	1.064863805	-0.352368470	30580
12	0.739637029	-0.454371052	56056

gem: dabcgefjhimklonqpsr
jsopdnlgkarhfmqecib
h0 v38 nfsqkramcejohgpldbi

U[3037] edges: 9 blocks: 1 orient: +

9_{243} (0) 8^1 1 blinks

r_{2314}^{28} #ts(full) 6

r	mod	theta/pi	#sts
03	1.000000000	-0.750000000	8
04	1.000000000	0.625000000	76
05	1.312862063	-0.325632347	512
06	0.577350269	0.666666667	2535
07	0.473952458	0.250000000	9544
08	0.000000000	0.000000000	30952
09	1.225189336	-0.871399638	87288
10	1.283438193	0.134341190	222617
11	1.243376165	-0.591717289	518144
12	1.527525232	0.435518859	1125444

gem: dabchefgjilknm
jmledcnihabfkg
h0 v28 ifnklbajgdhmec

U[3129] edges: 9 blocks: 5 orient: +

9_{244} (1) 4^1 1 blinks

$r_?^{36}$ #ts(full) 104

r	mod	theta/pi	#sts
03	1.414213562	-0.250000000	8
04	1.000000000	0.875000000	118
05	2.828427125	0.250000000	680
06	1.732050808	-0.166666667	3427
07	2.000000000	0.277830415	12752
08	2.797932652	-0.143826703	41724
09	1.414213562	0.472222222	116880
10	5.000000000	0.000000000	298725
11	2.449489743	-0.384057978	693880
12	3.234826365	-0.028479672	1509026

gem: dabchefgkijnlmporq
hrmedcoanqgkpilfjb
h0 v36 nogfrdcbhpmqkjiale

U[3133] edges: 9 blocks: 3 orient: +

9_{245} (0) 11^1 2 blinks

$r_?^{40}$ #ts(full) 98

r	mod	theta/pi	#sts
03	0.707106781	-0.500000000	4
04	0.500000000	0.250000000	48
05	0.371748034	0.500000000	172
06	0.288675135	1.000000000	765
07	1.064961507	-0.313544700	2148
08	1.385819299	0.375000000	6400
09	1.052015904	-0.747812608	14788
10	0.138196601	0.000000000	34965
11	0.811631978	-0.663331901	70420
12	1.370105818	0.225427573	143280

gem: dabcgefjhimklpnorqts
gpredhmfckjqtslboina
h0 v40 hngfircoqlpsbmatedjk

U[3139] edges: 9 blocks: 4 orient: +

U[3231] edges: 9 blocks: 3 orient: +

9_{246} (0) 5^1 1 blinks

$r_?^{42}$ #ts(full) 2

r	mod	theta/pi	#sts
03	0.707106781	1.000000000	4
04	0.500000000	1.000000000	48
05	0.831253875	0.800000000	172
06	0.288675135	1.000000000	765
07	0.918994326	0.670687558	2148
08	1.385819299	0.500000000	6400
09	1.086507409	0.734792068	14788
10	0.690983006	0.400000000	34965
11	0.293453090	0.848729848	70420
12	0.538030402	-0.761846816	143280

gem: dabchefgkijnlmposqrut
ktredquihpnjoaglfcbsm
h0 v42 qkfustblomghjinapdecr

U[3140] edges: 9 blocks: 4 orient: +

9_{247} (0) 7^1 1 blinks

$r_?^{44}$ #ts(full) 426

r	mod	theta/pi	#sts
03	0.707106781	-0.500000000	4
04	0.500000000	-0.250000000	48
05	0.928333668	0.824367653	172
06	0.288675135	0.000000000	765
07	0.707106781	0.642857143	2148
08	1.497904681	-0.375000000	6400
09	0.979884307	-0.894825412	14788
10	0.861803399	-0.648735306	34965
11	1.075120707	0.869879177	70420
12	0.380971319	0.562832958	143280

gem: dabcgefjhimklpnorqtsvu
jpqedkhgfmiualsbvorntc
h0 v44 ksnhmjalcrgdeivtpfuqbo

9_{248} (0) 13^1 2 blinks

$r_?^{40}$ #ts(full) 26

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	-0.500000000	48
05	0.928333668	-0.124367653	172
06	0.288675135	0.000000000	765
07	0.231920614	-0.571428571	2148
08	1.003135866	0.250000000	6400
09	1.185347098	0.328810655	14788
10	0.861803399	0.248735306	34965
11	1.288938699	0.126952543	70420
12	1.421804319	0.187167042	143280

gem: dabcgefjhimklpnorqts
gphsdjmtofinrqkblaec
h0 v40 tlqjcohgsdpbnmarekif

U[3142] edges: 9 blocks: 4 orient: +

U[3230] edges: 9 blocks: 3 orient: -

9_{249} (0) 11^1 2 blinks

r_{1919}^{30} #ts(full) 2

r	mod	theta/pi	#sts
03	0.707106781	-0.500000000	4
04	0.500000000	0.250000000	22
05	0.798872080	-0.354068341	80
06	0.288675135	1.000000000	255
07	0.289200275	-0.214285714	680
08	0.461939766	-0.625000000	1648
09	0.634263769	0.688209928	3588
10	0.638196601	-0.291863317	7309
11	0.707106781	0.681818182	13896
12	0.809630852	-0.177420481	25158

gem: dabcgefjhimklon
jomedchglabnfik
h0 v30 nligchdoekjbamf

U[3143] edges: 9 blocks: 6 orient: +

U[3234] edges: 9 blocks: 5 orient: +

9_{250} (0) 5^1 1 blinks

$r_?^{34}$ #ts(full) 38

r	mod	theta/pi	#sts
03	0.707106781	1.000000000	4
04	0.500000000	1.000000000	22
05	0.707106781	-0.100000000	80
06	0.288675135	1.000000000	255
07	0.521120889	0.571428571	680
08	0.844623199	-0.500000000	1648
09	0.508412761	0.244775531	3588
10	0.500000000	0.200000000	7309
11	0.668349896	0.665012094	13896
12	0.394337567	1.000000000	25158

gem: dabcgefjhimklonqp
jkmedchgpaboqilnf
h0 v34 nligchdoeqjpamfbk

U[3144] edges: 9 blocks: 6 orient: +

9_{251} (0) 7^1 1 blinks

$r_?^{32}$ #ts(full) 4

r	mod	theta/pi	#sts
03	0.707106781	-0.500000000	4
04	0.500000000	-0.250000000	22
05	0.601500955	-0.100000000	80
06	0.288675135	0.000000000	255
07	0.707106781	0.500000000	680
08	0.732537816	0.625000000	1648
09	0.634263769	0.645123405	3588
10	0.361803399	-0.800000000	7309
11	0.250852605	0.863636364	13896
12	0.394337567	0.250000000	25158

gem: dabcgefjhilknmpo
jlpedchgoainkbmf
h0 v32 oglhajmpcfnibked

U[3145] edges: 9 blocks: 6 orient: +

9_{252} (0) 13^1 2 blinks

r_{253}^{30} #ts(full) 38

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	-0.500000000	22
05	0.229752921	1.000000000	80
06	0.288675135	0.000000000	255
07	0.847218868	-0.411738079	680
08	0.844623199	-0.750000000	1648
09	0.508412761	0.911442198	3588
10	0.052786405	0.000000000	7309
11	0.308657459	0.853155410	13896
12	0.809630852	0.572579519	25158

gem: dabcgefjhimklon
jlkedcngmaobihf
h0 v30 ohelcbmfanjdgki

U[3146] edges: 9 blocks: 6 orient: +

U[3233] edges: 9 blocks: 5 orient: -

9_{253} (0) 9^1 3 blinks

$r_?^{44}$ #ts(full) 166

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	1.000000000	66
05	0.371748034	1.000000000	130
06	0.500000000	0.500000000	859
07	1.550186720	-0.018852028	1588
08	0.574025149	-0.500000000	5684
09	0.707106781	0.388888889	9780
10	0.138196601	0.000000000	25405
11	0.908312975	-0.422447665	41030
12	1.709981902	-0.816291459	87686

gem: dabcgefjhimklpnorqtsvu
jqtudskgmahnrlfbpiovec
h0 v44 rufotlbmepjchsdknvqiga

U[3160] edges: 9 blocks: 3 orient: +

U[3249] edges: 9 blocks: 2 orient: +

U[3257] edges: 9 blocks: 2 orient: +

9_{254} (0) 7^1 1 blinks

$r_?^{54}$ #ts(partial) 691

r	mod	theta/pi	#sts
03	0.707106781	-0.500000000	2
04	0.500000000	-0.250000000	66
05	0.493730098	-0.754068341	130
06	0.288675135	0.000000000	859
07	1.105676686	0.714285714	1588
08	0.574025148	0.625000000	5684
09	1.468890287	-0.326534008	9780
10	0.243769410	0.508136683	25405
11	1.664734104	-0.698037285	41030
12	1.798013456	0.315255138	87686

gem: dabchefgkijolmnqpsrutwvyxAz
kvyAdzlrhpasxwjoiqgmbuntfce
h0 v54 wmpjyvizAdqkbshclaurxftneog

9_{255} (0) 3^1 2 blinks

$r_?^{38}$ #ts(full) 335

r	mod	theta/pi	#sts
03	0.707106781	-0.500000000	2
04	0.500000000	-0.750000000	66
05	0.493730098	-0.845931659	130
06	0.500000000	0.500000000	859
07	0.331186263	0.195118687	1588
08	0.079256334	0.875000000	5684
09	0.266465147	-0.166666667	9780
10	0.243769410	0.691863317	25405
11	0.843683139	-0.353688744	41030
12	1.091781708	0.923815818	87686

gem: dabcgefjhimklonqpsr
jkoedcrgqabismfhlpn
h0 v38 ephfsdlmnqjgciborka

U[3162] edges: 9 blocks: 3 orient: +

U[3261] edges: 9 blocks: 2 orient: -

9_{256} (0) 2 blinks

$r_?^{40}$ #ts(full) 1

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	0.000000000	66
05	0.371748034	0.400000000	130
06	0.288675135	0.000000000	859
07	0.562859611	-0.417298019	1588
08	1.115221249	1.000000000	5684
09	1.012914143	0.593505764	9780
10	0.138196601	-0.800000000	25405
11	1.263863113	0.685503710	41030
12	1.653134110	0.253854879	87686

gem: dabchefgkijnlmporqts
kjrsdnmihoatqfbgplec
h0 v40 jtglomcspadkfenrhiqb

U[3163] edges: 9 blocks: 3 orient: +

U[3248] edges: 9 blocks: 2 orient: +

9_{257} (0) 2^1 1 blinks

$r_?^{44}$ #ts(full) 473

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	0.382683432	1.000000000	48
05	0.000000000	0.000000000	172
06	1.788675135	1.000000000	765
07	0.000000000	0.000000000	2148
08	0.795745448	0.663125019	6400
09	0.000000000	0.000000000	14788
10	2.012534744	0.885060668	34965
11	0.000000000	0.000000000	70420
12	2.066509943	0.353807355	143280

gem: dabcgefjhimklpnorqtsvu
jptedcmguasrhiqkovbfnl
h0 v44 rghtqkipbfjsnmlcuaoved

U[3173] edges: 9 blocks: 3 orient: +

9_{258} (0) 4^1 2 blinks

$r_?^{38}$ #ts(full) 310

r	mod	theta/pi	#sts
03	1.000000000	0.250000000	4
04	0.707106781	0.375000000	48
05	1.508772084	0.284341190	172
06	1.527525232	0.439481141	765
07	1.161590158	0.567037529	2148
08	1.500000000	0.437500000	6400
09	1.442855262	0.562253940	14788
10	1.014484897	0.683429989	34965
11	1.182817716	0.458230129	70420
12	1.080123450	0.564481141	143280

gem: dabcgefjhimklonqpsr
gqiedsofrkjbpmanlch
h0 v38 rgfhopblqesdjamcink

U[3178] edges: 9 blocks: 3 orient: +

U[3251] edges: 9 blocks: 2 orient: +

9_{259} (0) 6^1 1 blinks

$r_?^{40}$ #ts(full) 3

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	0.923879532	-0.750000000	54
05	0.000000000	0.000000000	200
06	1.366025404	0.500000000	937
07	0.000000000	0.000000000	2664
08	1.745453246	-0.427278008	8140
09	0.000000000	0.000000000	18928
10	1.666050861	0.811112998	45445
11	0.000000000	0.000000000	91776
12	2.216849889	-0.009041551	188546

gem: dabcgefjhimklpnorqts
mloedshgqkjpaitbnfrc
h0 v40 otkhanlrcmisfjeqpdgb

U[3180] edges: 9 blocks: 2 orient: +

9_{260} (1) 2 blinks

$r_?^{44}$ #ts(full) 6

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	4
04	1.000000000	0.000000000	54
05	1.543361918	0.275632347	200
06	1.000000000	0.333333333	937
07	1.757312152	0.634873164	2664
08	1.828427125	1.000000000	8140
09	1.850951660	-0.948046372	18928
10	2.236067977	-0.600000000	45445
11	1.952944037	-0.475398631	91776
12	3.088024997	-0.257149152	188546

gem: dabcgefjhimklpnosqrutwv
jvkpdohgracunmtebwfslqi
h0 v46 twlsqhuvepjobickngdarfm

U[3185] edges: 9 blocks: 2 orient: +

U[3250] edges: 9 blocks: 2 orient: -

9_{261} (0) 10^1 1 blinks

$r_?^{42}$ #ts(full) 4

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	0.923879533	1.000000000	52
05	0.000000000	0.000000000	196
06	0.912870929	0.397583618	937
07	0.000000000	0.000000000	2644
08	1.684408590	-0.546183107	8192
09	0.000000000	0.000000000	18928
10	1.368712161	0.549126662	45865
11	0.000000000	0.000000000	92136
12	1.605565824	-0.277971449	190516

gem: dabcgefjhimklpnosqrut
jrqedcogntpsimhkfbual
h0 v42 fhnsiaduerjqoctlpkgmb

9_{262} (0) 2^1 1 blinks

$r_?^{48}$ #ts(partial) 780

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	0.923879533	0.500000000	52
05	0.000000000	0.000000000	196
06	0.912870929	-0.602416382	937
07	0.000000000	0.000000000	2644
08	1.718523045	0.589246020	8192
09	0.000000000	0.000000000	18928
10	1.021075684	-0.148572537	45865
11	0.000000000	0.000000000	92136
12	0.616944562	0.922515162	190516

gem: dabcgefjhimklpnosqrvtuxw
jxnsdrhgkmifucwvpleoaqtb
h0 v48 onfuljbsvctxgmadwkhrpiqe

U[3200] edges: 9 blocks: 2 orient: +

9_{263} (0) 1 blinks

$r_?^{52}$ #ts(partial) 98

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	1.000000000	66
05	1.279920545	0.910914604	130
06	0.288675135	0.000000000	859
07	0.921740957	-0.572791769	1588
08	0.956708581	-0.500000000	5684
09	0.527363022	0.468813251	9780
10	1.638196601	0.178170792	25405
11	2.357722239	-0.127721962	41030
12	1.471687836	1.000000000	87686

gem: dabchefgkijnlmqopsrvtuxwzy
kjnedzmrhqapuywlbxtsgovicf
h0 v52 xyfmisbvqhwkdonrepcgzjluta

U[3203] edges: 9 blocks: 2 orient: +

9_{264} (0) 3^1 1 blinks

$r_?^{50}$ #ts(partial) 291

U[3204] edges: 9 blocks: 2 orient: +

r	mod	theta/pi	#sts
03	0.707106781	0.500000000	2
04	0.500000000	-0.250000000	66
05	0.743496069	0.500000000	130
06	0.500000000	-0.500000000	859
07	0.131913290	-0.652383846	1588
08	1.227306631	-0.375000000	5684
09	1.281482825	0.027751144	9780
10	0.552786405	0.000000000	25405
11	0.983764747	-0.124726714	41030
12	0.713424555	0.457606999	87686

gem: dabchefgkijnlmporqtswuvyx
hgowdvjapbykrtniumqcsxefl
h0 v50 quyfkpxthroisaednjvlbmgwc

9_{265} (0) 5^1 1 blinks

$r_?^{46}$ #ts(partial) 428

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	0.500000000	66
05	1.254172642	-0.965658810	130
06	0.288675135	1.000000000	859
07	0.316017332	0.485117021	1588
08	1.227306631	0.750000000	5684
09	0.779644664	-0.361603413	9780
10	1.572949017	-0.068682381	25405
11	2.072370733	0.154767132	41030
12	0.579429089	-0.526971390	87686

gem: dabcgefjhimklpnosqrutwv
jrnwdkugtapvcmqfobishle
h0 v46 ofhprlaqutjbevgdwmnkisc

U[3205] edges: 9 blocks: 2 orient: +

9_{266} (0) 9^1 3 blinks

$r_?^{42}$ #ts(full) 3

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	0.000000000	66
05	0.459505841	-0.400000000	130
06	0.500000000	0.500000000	859
07	1.047987635	-0.047030909	1588
08	0.956708581	0.000000000	5684
09	1.097309524	-0.126291151	9780
10	0.211145618	0.800000000	25405
11	1.282613478	0.022341175	41030
12	0.823922070	-0.176140632	87686

gem: dabchefgkijnlmqopsrut
komedcruhtasfbnjgqlpi
h0 v42 jgorupbathdksecfmlqin

U[3206] edges: 9 blocks: 2 orient: +

U[3374] edges: 9 blocks: 3 orient: -

U[3401] edges: 9 blocks: 2 orient: -

9_{267} (2) 3^1 1 blinks

$r_?^{42}$ #ts(full) 653

U[3228] edges: 9 blocks: 2 orient: +

r	mod	theta/pi	#sts
03	1.414213562	-0.500000000	8
04	1.000000000	0.250000000	100
05	3.280843188	-0.630853420	488
06	3.000000000	0.500000000	2515
07	3.326616259	-0.690114894	8424
08	5.082167562	0.351008795	28376
09	4.363323426	-0.693987322	74520
10	6.288811516	0.215710813	195061
11	6.221859690	-0.745347206	434280
12	5.598191312	0.081292158	962348

gem: dabcgefjhimklpnosqrut
jqskdmogtaerplhfbucin
h0 v42 npltuckmbsjfhaqiodgre

9_{268} (0) 1 blinks

$r_?^{48}$ #ts(partial) 1040

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	1.000000000	48
05	0.798872080	0.345931659	172
06	0.288675135	0.000000000	765
07	0.493788772	-0.976828893	2148
08	0.349854384	0.500000000	6400
09	0.567309949	-0.596054642	14788
10	0.638196601	-0.691863317	34965
11	1.281112170	-0.442243963	70420
12	0.741511756	-0.627285205	143280

gem: dabcgefjhimklpnosqrvtuxw
jwtedrnglavxhmfqpocsbkui
h0 v48 lgpxkiswuejadrtcfnboqhvm

9_{269} (0) 1 blinks

$r_?^{38}$ #ts(partial) 860

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	1.000000000	22
05	0.573741760	-0.524367653	72
06	0.288675135	0.000000000	227
07	0.430463769	-0.890318065	584
08	0.191341716	-0.500000000	1400
09	0.331842862	0.755224469	3004
10	0.329179607	-0.951264694	6081
11	0.567385434	0.710314954	11472
12	0.471687836	1.000000000	20694

gem: dabcgefjhimklonqpsr
jiqedsmgnafrhblocpk
h0 v38 plehirkocgjsqmdanfb

U[3232] edges: 9 blocks: 5 orient: +

9_{270} (0) 5^1 1 blinks

$r_?^{48}$ #ts(partial) 133

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	0.500000000	66
05	0.437016024	0.700000000	130
06	0.288675135	1.000000000	859
07	1.430448531	0.871548086	1588
08	0.079256334	-0.250000000	5684
09	0.883271519	0.955606442	9780
10	0.190983006	0.600000000	25405
11	0.882997572	-0.225590467	41030
12	0.380971319	-0.812832958	87686

gem: dabcgefjhimklpnosqrvtuxw
mwpedchgokjuxbvfnltsriqa
h0 v48 oiqpuxswbncfjmadktvrhgel

U[3247] edges: 9 blocks: 2 orient: +

9_{271} (0) 5^1 1 blinks

$r_?^{58}$ #ts(partial) 490

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	0.500000000	66
05	0.270090757	-0.300000000	130
06	0.288675135	1.000000000	859
07	0.301472038	0.138689104	1588
08	1.003135866	-0.250000000	5684
09	0.733744805	-0.575952331	9780
10	0.072949017	0.600000000	25405
11	1.320766523	-0.136637415	41030
12	0.846720683	-0.481554657	87686

gem: dabchefgkijnlmqoptrsvuxwzyCAB
kCoqdtxnhmywuicBepjfslvgaAzrb
h0 v58 tfpvrwasqblkxznyiAhgcBjCuoedm

U[3256] edges: 9 blocks: 2 orient: +

9_{272} (0) 7^1 2 blinks

$r_?^{44}$ #ts(full) 226

r	mod	theta/pi	#sts
03	0.707106781	-0.500000000	2
04	0.500000000	0.750000000	66
05	0.659357578	-0.365658810	130
06	0.288675135	0.000000000	859
07	0.750791136	0.727502121	1588
08	1.273733916	0.125000000	5684
09	1.183007664	-0.819253695	9780
10	0.434752416	-0.268682381	25405
11	0.652862557	-0.523680225	41030
12	0.390800930	-0.905133923	87686

gem: dabcgefjhimklpnorqtsvu
gtnudhrpvkjicmbfsaqoel
h0 v44 sfqokrhgalnjtevcpbiumd

U[3258] edges: 9 blocks: 2 orient: +

U[3371] edges: 9 blocks: 3 orient: -

9_{273} (0) 2 blinks

$r_?^{46}$ #ts(full) 6

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	1.000000000	66
05	0.843294502	-0.683429989	130
06	0.288675135	0.000000000	859
07	0.210928687	0.757883871	1588
08	1.115221249	-0.500000000	5684
09	1.472764532	-0.297060986	9780
10	0.711145618	-0.633140021	25405
11	1.780585880	-0.834665307	41030
12	1.056800351	-0.694263077	87686

gem: dabcgefjhimklpnosqrutwv
jskedcpgvqfbnmrwatloiuh
h0 v46 lrwtisauekjgdhcqpvfmnbo

U[3259] edges: 9 blocks: 2 orient: +

U[3402] edges: 9 blocks: 2 orient: +

9_{274} (0) 1 blinks

$r_?^{50}$ #ts(partial) 191

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	0.000000000	66
05	0.533005286	-0.369146580	130
06	0.288675135	0.000000000	859
07	0.734220341	-0.988273107	1588
08	0.891050484	1.000000000	5684
09	0.539287209	-0.598171423	9780
10	0.284094635	0.738293159	25405
11	0.965626380	-0.229865964	41030
12	1.512855805	-0.137639670	87686

gem: dabcgefjhimklpnosqrutwvyx
jvpodnhglybufmeckwtsiqxra
h0 v50 npurhbwtgxjvcaqfodlemsyki

U[3260] edges: 9 blocks: 2 orient: +

9_{275} (1) 3^1 1 blinks

$r_?^{32}$ #ts(full) 31

r	mod	theta/pi	#sts
03	1.000000000	0.500000000	8
04	1.000000000	0.750000000	56
05	1.000000000	-0.700000000	280
06	1.000000000	-0.333333333	1167
07	1.414213562	-0.170687558	4048
08	1.000000000	0.125000000	12296
09	0.347296355	0.277777778	33232
10	0.618033989	0.800000000	81921
11	0.500183993	-0.855002323	186472
12	0.517638090	0.833333333	397448

gem: cabfdeighljknmpo
ipncmkfoabgeldhj
h0 v32 mgopbleanicfhjkd

9_{276} (1) 4^1 1 blinks

$r_?^{38}$ #ts(full) 702

r	mod	theta/pi	#sts
03	1.414213562	0.250000000	8
04	0.000000000	0.000000000	118
05	1.414213562	-0.450000000	680
06	1.000000000	0.000000000	3427
07	2.828427125	0.448517972	12752
08	2.828427125	0.562500000	41724
09	0.170575027	-0.250000000	116880
10	2.195372431	-0.220132016	298725
11	1.817464225	0.206392368	693880
12	4.000000000	0.541666667	1509026

gem: dabcgefjhimklonqpsr
jisodrkgmahqbceflpn
h0 v38 nlfsicbqrkjgampodeh

U[3266] edges: 9 blocks: 2 orient: +

9_{277} (0) 4^1 1 blinks

$r_?^{36}$ #ts(full) 15

r	mod	theta/pi	#sts
03	1.000000000	0.250000000	4
04	0.707106781	0.875000000	18
05	1.376381920	0.950000000	52
06	0.577350269	1.000000000	141
07	1.042241778	-0.563544700	320
08	1.118033989	-0.664916382	680
09	0.428525073	-0.250000000	1312
10	1.170820393	-0.200000000	2405
11	0.455734141	-0.295454545	4148
12	0.816496581	0.291666667	6882

gem: dabchefgkijnlmporq
kmfrdqlphoagbjnice
h0 v36 einfadmjbhqkocrlpg

U[3273] edges: 9 blocks: 5 orient: +

9_{278} (0) 9^1 2 blinks

$r_?^{36}$ #ts(full) 1

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	1.000000000	18
05	0.573741760	0.875632347	34
06	0.500000000	0.500000000	115
07	0.185985892	0.285714286	196
08	0.732537816	-0.500000000	452
09	0.909038955	-0.333333333	708
10	0.329179607	0.248735306	1333
11	0.551891343	0.800747493	1958
12	0.275611854	0.861688385	3254

gem: dabchefgkijnlmporq
kpqedcoihnmgajlrfb
h0 v36 pgmjoibanrlkcfqhed

U[3284] edges: 9 blocks: 4 orient: +

U[3413] edges: 9 blocks: 5 orient: -

9_{279} (0) 11^1 1 blinks

$r_?^{36}$ #ts(full) 37

r	mod	theta/pi	#sts
03	0.707106781	-0.500000000	4
04	0.500000000	-0.750000000	18
05	0.798872080	0.154068341	52
06	0.288675135	1.000000000	141
07	0.417906506	-0.642857143	320
08	0.844623199	-0.125000000	680
09	0.618213611	-0.972875060	1312
10	0.638196601	0.691863317	2405
11	0.707106781	-0.227272727	4148
12	0.105662433	0.750000000	6882

gem: dabcgefjhimklpnorq
jrmpdongkaqhclfeib
h0 v36 ekiolnpmcbjarfdqgh

U[3317] edges: 9 blocks: 6 orient: +

9_{280} (0) 13^1 1 blinks

$r_?^{34}$ #ts(full) 7

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.500000000	18
05	0.601500955	-0.400000000	52
06	0.288675135	0.000000000	141
07	0.591009048	0.900741014	320
08	0.844623199	-0.250000000	680
09	0.806039450	0.144536259	1312
10	0.361803399	0.800000000	2405
11	0.144591748	0.454545455	4148
12	0.105662433	-0.500000000	6882

gem: dabcgefjhimklonqp
jomedphglabnqikfc
h0 v34 nlifhqcogkjbamped

U[3318] edges: 9 blocks: 6 orient: +

9_{281} (0) 13^1 1 blinks

r_{33}^{28} #ts(full) 67

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.500000000	24
05	0.601500955	0.400000000	76
06	0.288675135	0.000000000	225
07	0.231920614	-0.857142857	536
08	0.461939766	0.750000000	1184
09	0.303012985	0.666666667	2344
10	0.361803399	-0.800000000	4385
11	0.422061281	-0.727272727	7676
12	0.105662433	-0.500000000	12888

gem: dabcgefjhilknm
gkimdnlfcbjaeh
h0 v28 milfndkgbahcje

U[3325] edges: 9 blocks: 8 orient: +

9_{282} (0) 1 blinks

$r_?^{40}$ #ts(full) 1

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	1.000000000	18
05	0.371748034	0.800000000	34
06	0.288675135	0.000000000	115
07	0.960351647	-0.789939064	196
08	0.191341716	-0.500000000	452
09	0.872491117	1.000000000	708
10	0.138196601	0.400000000	1333
11	0.777181530	-0.458491042	1958
12	0.809630852	0.927420481	3254

gem: eabcdjfghilknmporqts
lqngfedmrkjpsciatohb
h0 v40 mihkrnqlbaocjtdgpsef

9_{283} (0) 10^1 1 blinks

$r_?^{40}$ #ts(partial) 1158

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	0.923879533	0.000000000	22
05	0.000000000	0.000000000	64
06	0.912870929	0.397583618	189
07	0.000000000	0.000000000	428
08	0.981319227	0.795513251	952
09	0.000000000	0.000000000	1828
10	0.707106781	-0.850000000	3445
11	0.000000000	0.000000000	5912
12	0.522663880	-0.373183522	9990

gem: dabcgefjhimklpnorqts
jtqedclgraphnmfkosib
h0 v40 qghoanimbsjpctrledkf

U[3347] edges: 9 blocks: 4 orient: +

9_{284} (0) 4^1 1 blinks

$r_?^{38}$ #ts(full) 389

r	mod	theta/pi	#sts
03	1.000000000	0.250000000	4
04	0.707106781	-0.625000000	46
05	1.376381920	-0.650000000	152
06	0.577350269	0.333333333	623
07	2.181348814	0.259243036	1580
08	0.579470825	0.268826703	4308
09	2.059218770	-0.974347823	9084
10	1.539746860	0.910914604	19809
11	1.441509086	-0.121053046	36784
12	2.165038708	-0.260547562	69610

gem: dabcgefjhimklonqpsr
gpiodmqnskjbfrelahc
h0 v38 nsepqbkgodhramijclf

U[3367] edges: 9 blocks: 4 orient: +

9_{285} (0) 1 blinks

$r_?^{44}$ #ts(full) 2151

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	0.000000000	34
05	0.798872081	-0.454068341	66
06	0.288675135	0.000000000	309
07	0.633550928	-0.930856949	552
08	0.191341716	0.000000000	1576
09	1.210428874	-0.990136865	2600
10	0.638196601	0.908136683	5725
11	1.530377565	0.391369332	8850
12	0.727402050	-0.143527443	16626

gem: dabcgefjhimklpnorqtsvu
gujldtvbforenmcspkqiha
h0 v44 kifoucqgrajsvltehbndpm

U[3372] edges: 9 blocks: 3 orient: +

9_{286} (0) 5^1 3 blinks

$r_?^{40}$ #ts(full) 4

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	0.500000000	34
05	1.091321678	0.424367653	66
06	0.288675135	1.000000000	309
07	1.147013505	0.816681081	552
08	0.303427098	0.750000000	1576
09	1.574552818	-0.628545097	2600
10	1.190983006	-0.848735306	5725
11	1.191818977	-0.363602950	8850
12	1.631897159	-0.473838125	16626

gem: dabcgefjhimklpnorqts
jqoedcsglaritmfbpkhn
h0 v40 nhrtiskmpgjfbadelcqo

U[3373] edges: 9 blocks: 3 orient: +

U[3404] edges: 9 blocks: 2 orient: -

U[3430] edges: 9 blocks: 3 orient: +

9_{287} (0) 4^1 1 blinks

$r_?^{42}$ #ts(full) 3

r	mod	theta/pi	#sts
03	1.000000000	-0.250000000	4
04	0.707106781	-0.375000000	46
05	1.630447550	-0.489303917	152
06	0.577350269	-0.333333333	623
07	1.285124168	-0.156897117	1580
08	1.500000000	-0.437500000	4308
09	2.802507888	-0.306950199	9084
10	3.348940559	-0.434596257	19809
11	2.245899260	-0.620478524	36784
12	3.284123752	-0.579979822	69610

gem: dabcgefjhimklpnosqrut
mqoedchgnkjtasfbpluri
h0 v42 tiqkhrbngapsemudcfljo

U[3387] edges: 9 blocks: 2 orient: +

9_{288} (0) 9^1 1 blinks

$r_?^{56}$ #ts(partial) 501

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	0.000000000	66
05	1.716745058	-0.491863317	130
06	0.500000000	0.500000000	859
07	0.811415584	-0.082666013	1588
08	2.039100781	0.000000000	5684
09	3.610306137	-0.699200782	9780
10	2.947213595	0.983726635	25405
11	4.648572893	0.758251030	41030
12	4.107919181	0.102416382	87686

gem: dabchefgkijnlmposqrvtuxwzyBA
hiredtzasgBkxonvpubmcqAfwjyl
h0 v56 mAwvkblzhdugByrecxtspjqonifa

U[3390] edges: 9 blocks: 3 orient: +

9_{289} (0) 3^1 1 blinks

$r_?^{48}$ #ts(full) 333

r	mod	theta/pi	#sts
03	0.707106781	-0.500000000	2
04	0.500000000	0.250000000	66
05	2.013153348	-0.547926993	130
06	0.500000000	0.500000000	859
07	1.704668877	-0.837858017	1588
08	2.533869596	0.375000000	5684
09	1.852043346	0.978732391	9780
10	4.052786404	0.095853986	25405
11	3.507545580	-0.745784504	41030
12	3.297726489	-0.121118942	87686

gem: dabcgefkhijnlmqopsrvtuxw
gvosdrnfxtlkjacbhqemwpui
h0 v48 eglxapuomvfwrhnkditsbjcq

9_{290} (0) 3^1 1 blinks

$r_?^{56}$ #ts(partial) 257

r	mod	theta/pi	#sts
03	0.707106781	-0.500000000	2
04	0.500000000	-0.750000000	34
05	0.283990228	-0.700000000	66
06	0.500000000	0.500000000	309
07	0.512139742	0.849780220	552
08	0.303427098	-0.125000000	1576
09	0.392691631	-0.202252214	2600
10	0.080650449	0.400000000	5725
11	1.581377246	-0.527514887	8850
12	1.532553607	0.763917630	16626

gem: dabchefgkijnlmqopsrvtuxwzyBA
hwledBjxqsAkbzntipgrymvauocf
h0 v56 qrgtAvushxoiawBjmblzcfnpedyk

U[3392] edges: 9 blocks: 2 orient: +

9_{291} (2) 3^1 1 blinks

r_{8793}^{30} #ts(full) 4

r	mod	theta/pi	#sts
03	1.414213562	-0.500000000	8
04	1.000000000	-0.750000000	40
05	2.288245611	1.000000000	152
06	3.000000000	0.500000000	475
07	2.000000000	0.115026728	1280
08	2.797932652	-0.081326703	3072
09	3.741657387	-0.560518859	6720
10	2.236067978	1.000000000	13629
11	2.449489743	0.906785251	25960
12	3.605551275	0.437167042	46904

gem: dabchefgkijmlon
kmnedclihgajofb
h0 v30 gfjnokalecbhdmi

U[3393] edges: 9 blocks: 4 orient: +

9_{292} (0) 5^1 1 blinks

$r_?^{50}$ #ts(full) 2

U[3400] edges: 9 blocks: 2 orient: +

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	0.500000000	34
05	0.580414541	0.954068341	66
06	0.288675135	1.000000000	309
07	0.714553588	-0.867433121	552
08	0.303427098	0.750000000	1576
09	1.152646464	-0.031980973	2600
10	0.336881039	0.091863317	5725
11	0.467686734	-0.811733300	8850
12	0.640555687	-0.432929101	16626

gem: dabchefgkijnlmporqtsvuxwzy
kyrudomihwabxfnspvqetczglj
h0 v52 muwqjxblsrhkvteczoyngapfid

9_{293} (0) 2 blinks

$r_?^{48}$ #ts(full) 45

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	0.000000000	34
05	0.634136124	0.042016670	66
06	0.288675135	0.000000000	309
07	1.556183866	0.260020209	552
08	0.032829048	0.000000000	1576
09	0.284023517	-0.140657553	2600
10	0.402128624	-0.084033340	5725
11	0.973929637	-0.124402736	8850
12	0.515726692	0.578810460	16626

gem: dabchefgkijnlmporqtswuvyx
kvrndmuihsacqebfplygtoxwj
h0 v50 mgyijcxwpetkuondhvrlasqbf

U[3403] edges: 9 blocks: 2 orient: +

U[3428] edges: 9 blocks: 3 orient: -

9_{294} (0) 4^1 1 blinks

$r_?^{36}$ #ts(partial) 1150

r	mod	theta/pi	#sts
03	1.000000000	0.250000000	4
04	0.707106781	-0.625000000	16
05	1.129775731	0.004068341	44
06	0.577350269	-0.333333333	107
07	1.655970555	0.250000000	224
08	0.500000000	0.937500000	432
09	0.943665897	0.612553511	768
10	0.867632644	-0.563081267	1293
11	0.830768765	0.770174499	2068
12	1.080123450	-0.435518859	3184

gem: dabchefgkijnlmporq
hrindoqacflkjpmegb
h0 v36 qogfrdcbhnmpkjiale

U[3418] edges: 9 blocks: 6 orient: +

9_{295} (0) 9^1 3 blinks

$r_?^{34}$ #ts(full) 6

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	1.000000000	18
05	1.395425955	0.830853420	34
06	0.500000000	0.500000000	115
07	1.264734066	-0.274440876	196
08	1.497904681	-0.500000000	452
09	0.621819268	0.722222222	708
10	1.947213596	0.338293159	1333
11	1.413283216	0.087154858	1958
12	1.228403271	-0.774572427	3254

gem: dabcgefjhimklonqp
jmoedcqgpainblfkh
h0 v34 pfkjnlameqcbhigod

U[3421] edges: 9 blocks: 5 orient: +

U[3425] edges: 9 blocks: 4 orient: +

U[3432] edges: 9 blocks: 3 orient: +

9_{296} (0) 9^{1} 1 blinks

$r_{?}^{36}$ #ts(partial) 1116

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	1.000000000	3
05	0.371748034	-0.600000000	4
06	0.500000000	0.500000000	5
07	0.521120889	1.000000000	6
08	0.191341716	0.500000000	7
09	0.707106781	0.833333333	8
10	0.138196601	-0.800000000	9
11	0.422061281	0.727272727	10
12	0.353553391	-0.750000000	11

gem: dabchefgjilknmporq
jnredqbphaiolgmkfc
h0 v36 mhqfajolndgbeircpk

APPENDIX B

The 14 composite spaces in U

We here present the 14 spaces induced from g-blinks in U. Their "connected sum" details: what prime spaces compose to them are shown in Chapter 5. The elements of this presentation are the same as the explained in Appendix A.

6_1^c (0) 2^2 10 blinks

r_1^{14} #ts(full) 1

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	0.292893219	0.000000000	16
05	0.000000000	0.000000000	44
06	0.154700538	0.000000000	107
07	0.000000000	0.000000000	224
08	0.099456184	0.000000000	432
09	0.000000000	0.000000000	768
10	0.070831675	0.000000000	1293
11	0.000000000	0.000000000	2068
12	0.053746907	0.000000000	3184

gem: cabedgf
gfdcbea
h0 v14 fgebcad

6_2^c (0) 3^2 10 blinks

r_{17}^{22} #ts(full) 2

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	16
05	0.973248989	0.000000000	44
06	0.866025404	0.000000000	107
07	0.753041503	0.000000000	224
08	1.115221249	0.000000000	432
09	1.033720959	0.000000000	768
10	0.947213596	0.000000000	1293
11	1.252313534	0.000000000	2068
12	1.183012702	0.000000000	3184

gem: dabcgefihkj
khfedcbgjia
h0 v22 jiegcbdakhf

6_3^c (0) 6^1 23 blinks

r_4^{18} #ts(full) 1

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	2
04	0.382683432	-0.250000000	6
05	0.000000000	0.000000000	10
06	0.366025404	-0.500000000	19
07	0.000000000	0.000000000	28
08	0.333040012	-0.875000000	44
09	0.000000000	0.000000000	60
10	0.259022635	0.800000000	85
11	0.000000000	0.000000000	110
12	0.252157240	0.500000000	146

gem: dabcgefih
ihfedcbga
h0 v18 higfbdcae

8_1^c (0) $2^1 4^1$ 4 blinks

r_3^{22} #ts(full) 5

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	0.541196100	0.625000000	46
05	0.000000000	0.000000000	184
06	0.422649731	-0.333333333	789
07	0.000000000	0.000000000	2360
08	0.360479911	0.562500000	6876
09	0.000000000	0.000000000	16496
10	0.320169585	-0.400000000	38465
11	0.000000000	0.000000000	79336
12	0.291166101	0.541666667	159786

gem: dabcgefihkj
ihjedkbgacf
h0 v22 hiejkbdafgc

8^c_2 (0) 10^1 2 blinks

r^{22}_5 #ts(full) 3

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	0.382683432	1.000000000	42
05	0.000000000	0.000000000	148
06	0.211324865	1.000000000	597
07	0.000000000	0.000000000	1664
08	0.333040012	0.000000000	4616
09	0.000000000	0.000000000	10720
10	0.000000000	0.000000000	24125
11	0.000000000	0.000000000	48980
12	0.281244857	1.000000000	96186

gem: dabcgefihkj
ihkedjbgafc
h0 v22 higkbdjaecf

U[522] edges: 8 blocks: 1 orient: +

8^c_3 (1) 2^1 13 blinks

r^{8}_1 h1 #ts(full) 1

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	0.765366865	1.000000000	26
05	0.000000000	0.000000000	96
06	0.732050808	0.000000000	315
07	0.000000000	0.000000000	856
08	0.720959822	1.000000000	2096
09	0.000000000	0.000000000	4612
10	0.715920956	0.000000000	9449
11	0.000000000	0.000000000	18072
12	0.713208378	1.000000000	32834

gem: badc
dcba
h1 v8 cdab

U[305] edges: 8 blocks: 2 orient: +

U[586] edges: 8 blocks: 3 orient: +

U[793] edges: 9 blocks: 1 orient: +

U[345] edges: 8 blocks: 3 orient: +

U[724] edges: 8 blocks: 3 orient: +

U[1289] edges: 9 blocks: 4 orient: +

U[408] edges: 8 blocks: 5 orient: +

U[792] edges: 9 blocks: 1 orient: +

U[1290] edges: 9 blocks: 4 orient: +

U[1921] edges: 9 blocks: 2 orient: +

U[2918] edges: 9 blocks: 3 orient: +

U[1922] edges: 9 blocks: 2 orient: +

U[1924] edges: 9 blocks: 2 orient: +

8^c_4 (2) 6 blinks

r^{2}_1 h2 #ts(full) 1

r	mod	theta/pi	#sts
03	1.414213562	0.000000000	4
04	2.000000000	0.000000000	16
05	2.689994048	0.000000000	68
06	3.464101615	0.000000000	203
07	4.311820252	0.000000000	548
08	5.226251860	0.000000000	1328
09	6.202325755	0.000000000	2904
10	7.236067978	0.000000000	5893
11	8.324234537	0.000000000	11268
12	9.464101615	0.000000000	20368

gem: a
a
h2 v2 a

U[337] edges: 8 blocks: 1 orient: +

U[347] edges: 8 blocks: 3 orient: +

U[352] edges: 8 blocks: 1 orient: +

U[353] edges: 8 blocks: 1 orient: +

U[1280] edges: 9 blocks: 4 orient: +

U[1918] edges: 9 blocks: 2 orient: +

8^c_5 (1) 2^2 1 blinks

r^{18}_1 h1 #ts(full) 1

r	mod	theta/pi	#sts
03	2.000000000	0.000000000	8
04	3.162277660	0.102416382	58
05	4.297922283	0.254068341	280
06	5.291502622	0.439481141	1069
07	6.162453799	0.653089436	3408
08	7.081111186	0.889255678	9416
09	8.277283502	-0.862553511	23344
10	9.864327229	-0.614494597	52805
11	11.750675549	-0.372937200	111096
12	13.718973560	-0.137205455	219466

gem: cabfdeigh
ihdcbgfea
h1 v18 gfhaibdce

U[522] edges: 8 blocks: 1 orient: +

9^c_1 (0) 10^1 8 blinks

r^{26}_{49} #ts(full) 32

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	0.382683432	-0.500000000	46
05	0.000000000	0.000000000	184
06	0.211324865	1.000000000	789
07	0.000000000	0.000000000	2360
08	0.333040012	0.750000000	6876
09	0.000000000	0.000000000	16496
10	0.357960478	0.600000000	38465
11	0.000000000	0.000000000	79336
12	0.281244857	0.500000000	159786

gem: dabcgefihkjml
iklmdbjgahfce
h0 v26 hgmljdbkeiafc

U[1070] edges: 9 blocks: 2 orient: +

U[2311] edges: 9 blocks: 3 orient: -

U[2876] edges: 9 blocks: 6 orient: -

U[2056] edges: 9 blocks: 4 orient: +

U[2516] edges: 9 blocks: 5 orient: +

U[2880] edges: 9 blocks: 6 orient: -

U[2064] edges: 9 blocks: 4 orient: +

U[2608] edges: 9 blocks: 4 orient: +

9^c_2 (1) 3^1 3 blinks

r^{12}_{1} h1 #ts(full) 1

r	mod	theta/pi	#sts
03	1.000000000	-0.500000000	4
04	1.000000000	-0.750000000	32
05	1.618033989	0.900000000	148
06	1.732050808	0.500000000	625
07	1.801937736	0.214285714	1876
08	2.414213562	-0.125000000	5400
09	2.532088886	-0.500000000	13064
10	2.618033989	-0.800000000	30353
11	3.228707415	0.863636364	62740
12	3.346065215	0.500000000	125968

gem: cabfde
fedcba
h1 v12 edfbac

U[1128] edges: 9 blocks: 3 orient: +

U[1691] edges: 9 blocks: 2 orient: +

U[2886] edges: 9 blocks: 4 orient: +

9^c_3 (1) 4^1 2 blinks

r^{16}_{2} h1 #ts(full) 2

r	mod	theta/pi	#sts
03	1.414213562	0.250000000	8
04	1.414213562	0.375000000	98
05	1.414213562	0.350000000	536
06	2.000000000	0.333333333	2575
07	2.548324784	0.392857143	9328
08	2.613125930	0.437500000	29900
09	2.657852097	0.416666667	82608
10	3.236067977	0.400000000	208897
11	3.793637873	0.431818182	481448
12	3.863703305	0.458333333	1040582

gem: cabfdehg
hedcbgfa
h1 v16 gfeahbdc

U[1973] edges: 9 blocks: 1 orient: +

U[1974] edges: 9 blocks: 1 orient: +

9^c_4 (0) 2^1 4 blinks

r^{30}_{2346} #ts(full) 3

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	0.382683432	0.000000000	42
05	0.000000000	0.000000000	160
06	0.211324865	0.000000000	637
07	0.000000000	0.000000000	1904
08	0.528130334	-0.500000000	5284
09	0.000000000	0.000000000	12772
10	0.678130063	0.800000000	28881
11	0.000000000	0.000000000	60016
12	0.577435507	0.072579519	118422

gem: dabcgefjhimklon
jonedcmglafihkb
h0 v30 lnomkiacfejgdbh

U[2053] edges: 9 blocks: 4 orient: +

U[3199] edges: 9 blocks: 2 orient: +

U[2062] edges: 9 blocks: 4 orient: +

U[2306] edges: 9 blocks: 3 orient: +

9^c_5 (2) 1 blinks

r^{26}_{31} h1 #ts(full) 2

r	mod	theta/pi	#sts
03	1.414213562	0.000000000	8
04	0.000000000	0.000000000	66
05	2.689994048	0.600000000	344
06	3.464101615	0.333333333	1483
07	0.000000000	0.000000000	5264
08	5.226251859	0.750000000	16196
09	6.202325755	0.444444444	44304
10	0.000000000	0.000000000	109933
11	8.324234537	0.818181818	251944
12	9.464101615	0.500000000	539078

gem: dabcgefihkjml
ijmedckgalhbf
h1 v26 lfhkjbaceimgd

U[2281] edges: 9 blocks: 1 orient: +

9^c_6 (1) 4^1 1 blinks

r^{20}_{4} h1 #ts(full) 1

r	mod	theta/pi	#sts
03	1.414213562	0.250000000	8
04	1.414213562	0.875000000	58
05	3.039089992	-0.504068341	280
06	4.000000000	0.000000000	1069
07	3.754708335	0.655400322	3408
08	5.843127213	-0.664916382	9416
09	7.070105072	-0.105463741	23344
10	6.278248790	0.563081267	52805
11	8.745374944	-0.733235861	111096
12	10.222398085	-0.147814474	219466

gem: cabfdehgji
hjdcbifage
h1 v20 ifgahbjedc

U[2981] edges: 9 blocks: 2 orient: +

APPENDIX C

Simple 3-connected monochromatic blinks up to 16 edges

We here present all simple 3-connected green blinks with ≤ 16 edges divided in 381 HGnQI classes. The quantum invariant was calculated up to level $r = 8$ for each of these blinks. There are left 11 uncertainties: 14.24t, 15.16t, 15.19t, 15.22t, 16.42t, 16.56t, 16.141t, 16.142t, 16.149t, 16.233t. Except for these classes the other 370 consisted of only one blink (or the two orientations of the same space). This fact suggests that if A and B are two different simple 3-connected monochromatic blinks, that do not form a trivial pair (trivially induce the same space), then they probably induce different spaces. Are the 11 uncertainties examples of non-trivial pairs?

14.24t
15.16t
15.19t
15.22t
16.56t
16.141t
16.142t
16.233t
16.42t
16.140t
16.149t

6^t_1 (3) 1 blinks

T[1] edges: 6 blocks: 1 orient: +

r	mod	theta/pi	#sts
03	2.000000000	0.000000000	8
04	3.000000000	0.000000000	40
05	4.000000000	0.000000000	152
06	5.000000000	0.000000000	475
07	6.000000000	0.000000000	1280
08	7.000000000	0.000000000	3072

8^t_1 (1) 1 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	0.000000000	0.000000000	18
05	1.763932023	0.000000000	36
06	2.000000000	0.000000000	119
07	0.166603321	0.000000000	232
08	0.343145751	0.000000000	522

T[2] edges: 8 blocks: 1 orient: +

9^t_1 (0) 3^1 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	-0.500000000	2
04	0.500000000	0.250000000	34
05	0.739059264	0.395538531	80
06	0.500000000	0.500000000	351
07	1.759536836	0.282056233	908
08	0.396281669	-0.625000000	2482

T[3] edges: 9 blocks: 1 orient: +

T[4] edges: 9 blocks: 1 orient: -

10^t_1 (0) 1 blinks

T[5] edges: 10 blocks: 1 orient: +

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	46
05	1.520512637	0.000000000	180
06	0.288675135	0.000000000	819
07	0.354132814	0.000000000	2624
08	1.459443058	0.000000000	8112

10^t_2 (1) 1 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	1.000000000	0.000000000	34
05	1.909830056	0.000000000	68
06	1.000000000	0.000000000	313
07	1.326975813	0.000000000	620
08	1.544155877	0.000000000	1710

T[6] edges: 10 blocks: 1 orient: +

11^t_1 (0) 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	8
04	0.500000000	0.000000000	104
05	1.301508621	0.007797643	696
06	0.288675135	0.000000000	3935
07	0.514770346	0.138673801	17616
08	0.349854384	0.000000000	67720

T[7] edges: 11 blocks: 1 orient: +

T[9] edges: 11 blocks: 1 orient: -

11^t_2 (0) 2 blinks

T[8] edges: 11 blocks: 1 orient: +

T[10] edges: 11 blocks: 1 orient: -

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	0.000000000	66
05	0.528270419	0.710100601	152
06	0.288675135	0.000000000	945
07	0.643848101	0.704127476	2444
08	0.535563526	1.000000000	8158

12^t_1 (0) 3^1 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.500000000	16
04	0.500000000	0.750000000	288
05	1.467514724	-0.615405671	3392
06	0.500000000	-0.500000000	29625
07	1.128408102	0.271038230	201936
08	2.943749502	0.125000000	1119088

T[11] edges: 12 blocks: 1 orient: +

T[14] edges: 12 blocks: 1 orient: -

12^t_2 (0) 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	142
05	0.939358929	0.881610993	708
06	0.288675135	0.000000000	4933
07	1.293840461	0.900343653	23632
08	1.049563152	1.000000000	100280

T[12] edges: 12 blocks: 1 orient: +

T[21] edges: 12 blocks: 1 orient: -

12^t_3 (2) 1 blinks

T[13] edges: 12 blocks: 1 orient: +

r	mod	theta/pi	#sts
03	1.414213562	0.000000000	16
04	2.000000000	0.000000000	216
05	3.325015502	0.000000000	2160
06	3.464101615	0.000000000	16355
07	4.387097719	0.000000000	98016
08	5.597670143	0.000000000	483424

12^t_4 (1) 1 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	1.000000000	0.000000000	66
05	0.729490169	0.000000000	186
06	0.000000000	0.000000000	1101
07	0.088770501	1.000000000	3872
08	0.137084990	1.000000000	13172

12^t_5 (0) 1 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	86
05	0.810537068	0.000000000	388
06	0.288675135	0.000000000	2355
07	0.707336305	0.000000000	9912
08	2.202279626	0.000000000	37584

T[16] edges: 12 blocks: 1 orient: +

12^t_6 (1) 1 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	1.000000000	0.000000000	66
05	1.347524158	0.000000000	182
06	1.000000000	0.000000000	1073
07	1.790085668	0.000000000	3728
08	3.176623509	0.000000000	12480

T[17] edges: 12 blocks: 1 orient: +

12^t_7 (0) 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	78
05	0.236975265	-0.773504147	384
06	0.288675135	0.000000000	2143
07	0.455253671	-0.715141040	9476
08	0.284196287	1.000000000	35428

T[18] edges: 12 blocks: 1 orient: +

T[20] edges: 12 blocks: 1 orient: -

12^t_8 (1) 1 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	1.000000000	0.000000000	66
05	0.347524158	0.000000000	152
06	0.000000000	0.000000000	945
07	0.033607422	0.000000000	2444
08	1.005050634	0.000000000	8158

T[19] edges: 12 blocks: 1 orient: +

12^t_9 (3) 1 blinks

r	mod	theta/pi	#sts
03	2.000000000	0.000000000	8
04	4.000000000	0.000000000	96
05	4.291796068	0.000000000	600
06	4.000000000	0.000000000	2969
07	2.470743926	0.000000000	11824
08	0.402020254	0.000000000	40320

T[22] edges: 12 blocks: 1 orient: +

13^t_1 (0) 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	8
04	0.500000000	0.000000000	188
05	0.726837830	0.005333035	1472
06	0.288675135	0.000000000	11231
07	1.810786833	-0.060672234	64168
08	0.125683619	0.000000000	311648

T[23] edges: 13 blocks: 1 orient: +

T[26] edges: 13 blocks: 1 orient: -

13^t_2 (1) 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	8
04	1.000000000	0.000000000	204
05	1.828250300	-0.185063736	1576
06	1.000000000	0.000000000	12875
07	0.773019359	-0.050954692	71400
08	0.029437252	0.000000000	355456

T[24] edges: 13 blocks: 1 orient: +

T[35] edges: 13 blocks: 1 orient: -

13^t_3 (0) 3^1 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	-0.500000000	2
04	0.500000000	-0.750000000	130
05	0.370402770	0.996599821	340
06	0.500000000	0.500000000	2865
07	1.333558314	-0.822310775	9948
08	0.067991185	0.875000000	40254

T[25] edges: 13 blocks: 1 orient: +

T[33] edges: 13 blocks: 1 orient: -

13^t_4 (2) 2 blinks

r	mod	theta/pi	#sts
03	1.414213562	0.000000000	8
04	2.000000000	0.000000000	172
05	1.473190378	-0.369146580	1520
06	3.000000000	-0.166666667	10895
07	2.635346683	-0.189184164	65128
08	1.421947833	0.000000000	313536

T[27] edges: 13 blocks: 1 orient: +

T[43] edges: 13 blocks: 1 orient: -

13^t_5 (0) 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	150
05	1.163430902	-0.254660513	720
06	0.288675135	0.000000000	5789
07	0.265886467	-0.391062613	25768
08	0.333923058	1.000000000	117096

T[28] edges: 13 blocks: 1 orient: +

T[38] edges: 13 blocks: 1 orient: -

13^t_6 (0) 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	0.000000000	130
05	0.515888138	-0.704882690	338
06	0.288675135	0.000000000	2855
07	1.236532253	-0.848421556	9788
08	0.431443806	1.000000000	39560

T[29] edges: 13 blocks: 1 orient: +

T[39] edges: 13 blocks: 1 orient: -

13^t_7 (0) 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	0.000000000	130
05	0.822757750	-0.665031785	354
06	0.288675135	0.000000000	3015
07	0.362894690	-0.918895409	10472
08	0.114418471	1.000000000	43544

T[30] edges: 13 blocks: 1 orient: +

T[40] edges: 13 blocks: 1 orient: -

13^t_8 (0) 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	0.000000000	130
05	0.835593533	-0.945422087	330
06	0.288675135	0.000000000	2813
07	0.693817645	-0.832870408	9438
08	0.268264961	0.000000000	38250

T[31] edges: 13 blocks: 1 orient: +

T[41] edges: 13 blocks: 1 orient: -

13^t_9 (1) 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	4
04	1.000000000	0.000000000	142
05	0.957100463	0.335791136	696
06	0.000000000	0.000000000	4945
07	0.349665016	-0.167975067	23388
08	0.313708499	1.000000000	100252

T[32] edges: 13 blocks: 1 orient: +

T[42] edges: 13 blocks: 1 orient: -

13^t_{10} (0) 3^1 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	-0.500000000	2
04	0.500000000	-0.750000000	130
05	0.611740042	-0.864328736	284
06	0.500000000	0.500000000	2547
07	0.334843358	-0.935290994	6452
08	0.292161950	0.875000000	26518

T[34] edges: 13 blocks: 1 orient: +

T[37] edges: 13 blocks: 1 orient: -

13^t_{11} (1) 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	4
04	1.000000000	0.000000000	142
05	1.069569378	0.451264694	612
06	1.000000000	0.333333333	4347
07	1.414565623	0.427608969	16544
08	1.928932188	0.000000000	67680

T[36] edges: 13 blocks: 1 orient: +

T[44] edges: 13 blocks: 1 orient: -

14^t_1 (0) 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	294
05	0.529391988	0.940418569	1296
06	0.288675135	0.000000000	13919
07	0.528131657	0.944351349	63000
08	0.221271574	1.000000000	327948

T[45] edges: 14 blocks: 1 orient: +

T[72] edges: 14 blocks: 1 orient: -

14^t_2 (1) 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	8
04	1.000000000	0.000000000	324
05	1.722981070	0.461441406	2888
06	1.000000000	0.333333333	26689
07	1.554211335	-0.152462087	170816
08	1.443650814	1.000000000	942592

T[46] edges: 14 blocks: 1 orient: +

T[99] edges: 14 blocks: 1 orient: -

14^t_3 (0) 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	1.000000000	140
05	1.162192925	-0.843795532	836
06	0.288675135	0.000000000	5783
07	0.283888148	-0.360662342	35852
08	0.623751920	0.500000000	167588

T[47] edges: 14 blocks: 1 orient: +

T[49] edges: 14 blocks: 1 orient: -

14^t_{4} (2) 1 blinks

r	mod	theta/pi	#sts
03	1.414213562	0.000000000	16
04	2.000000000	0.000000000	320
05	2.932550660	0.000000000	4384
06	3.464101615	0.000000000	44507
07	7.968597806	0.000000000	348656
08	8.505291112	0.000000000	2187968

14^t_{5} (0) 1 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	166
05	0.539350531	0.000000000	896
06	0.288675135	0.000000000	7875
07	2.081327461	0.000000000	42336
08	3.380259781	0.000000000	206744

T[50] edges: 14 blocks: 1 orient: +

14^t_{6} (0) 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	166
05	0.539350531	0.000000000	964
06	0.288675135	0.000000000	8067
07	0.609752835	0.203153157	47008
08	0.318792322	0.000000000	229168

T[51] edges: 14 blocks: 1 orient: +

T[54] edges: 14 blocks: 1 orient: -

14^t_{7} (0) 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	278
05	1.249947405	0.810036667	1300
06	0.288675135	0.000000000	13443
07	0.298691512	0.489055421	62360
08	0.521564994	0.000000000	328316

T[52] edges: 14 blocks: 1 orient: +

T[82] edges: 14 blocks: 1 orient: -

14^t_{8} (0) 6^1 2 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	2
04	0.382683432	-0.250000000	258
05	0.000000000	0.000000000	630
06	0.707106781	0.750000000	7761
07	0.000000000	0.000000000	25848
08	0.366320633	0.919436199	128224

T[53] edges: 14 blocks: 1 orient: +

T[91] edges: 14 blocks: 1 orient: -

14^t_{9} (0) 2^1 2 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	2
04	0.382683432	1.000000000	258
05	0.000000000	0.000000000	644
06	0.788675135	1.000000000	7975
07	0.000000000	0.000000000	26432
08	0.537750816	0.399620453	132158

T[55] edges: 14 blocks: 1 orient: +

T[95] edges: 14 blocks: 1 orient: -

14^t_{10} (0) 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	150
05	1.122038164	0.248866077	860
06	0.288675135	0.000000000	6927
07	0.917745700	-0.226832506	39420
08	0.712740903	0.000000000	189208

T[56] edges: 14 blocks: 1 orient: +

T[70] edges: 14 blocks: 1 orient: -

14^t_{11} (1) 1 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	1.000000000	0.000000000	130
05	0.278640450	0.000000000	434
06	0.000000000	0.000000000	3497
07	1.165806718	0.000000000	16784
08	0.661038332	1.000000000	71248

T[57] edges: 14 blocks: 1 orient: +

14^t_{12} (0) 2^1 2 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	2
04	0.382683432	1.000000000	258
05	0.000000000	0.000000000	668
06	0.211324865	0.000000000	8287
07	0.000000000	0.000000000	27596
08	0.999399697	0.492866731	139918

T[58] edges: 14 blocks: 1 orient: +

T[100] edges: 14 blocks: 1 orient: -

14^t_{13} (2) 2 blinks

r	mod	theta/pi	#sts
03	1.414213562	0.000000000	4
04	2.000000000	0.000000000	278
05	0.562708652	-0.569146579	1324
06	1.732050808	0.000000000	12843
07	2.016369919	0.035633663	62952
08	4.157057602	0.000000000	315672

T[59] edges: 14 blocks: 1 orient: +

T[101] edges: 14 blocks: 1 orient: -

14^t_{14} (0) 2^1 2 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	2
04	0.382683432	1.000000000	258
05	0.000000000	0.000000000	650
06	0.788675135	1.000000000	8045
07	0.000000000	0.000000000	26876
08	0.218421595	0.100236673	135780

T[96] edges: 14 blocks: 1 orient: -

14^t_{15} (1) 1 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	8
04	1.000000000	0.000000000	228
05	1.201626124	0.000000000	2000
06	1.000000000	0.000000000	18501
07	1.108132949	0.000000000	120784
08	0.833477759	0.000000000	670328

T[61] edges: 14 blocks: 1 orient: +

14^t_{16} (1) 1 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	8
04	1.000000000	0.000000000	184
05	0.798373876	1.000000000	1832
06	0.000000000	0.000000000	15169
07	0.177221297	1.000000000	104360
08	0.455844123	1.000000000	569736

T[62] edges: 14 blocks: 1 orient: +

14^t_{17} (0) 4^1 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.250000000	2
04	0.707106781	0.375000000	130
05	0.300779402	0.116145903	434
06	0.577350269	0.333333333	3497
07	0.225065982	0.230708887	16784
08	0.306133161	0.378573476	71248

T[63] edges: 14 blocks: 1 orient: +

T[78] edges: 14 blocks: 1 orient: -

14^t_{18} (0) 4^1 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	-0.250000000	2
04	0.707106781	-0.875000000	130
05	0.225834887	-0.398735306	406
06	0.577350269	-0.333333333	3271
07	1.204515697	0.085723784	15284
08	0.419281159	0.995048141	63942

T[64] edges: 14 blocks: 1 orient: +

T[76] edges: 14 blocks: 1 orient: -

14^t_{19} (1) 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	1.000000000	0.000000000	130
05	1.048646687	0.361585810	428
06	1.000000000	0.333333333	3451
07	1.882830404	0.187297094	16316
08	0.221212662	0.000000000	68634

T[65] edges: 14 blocks: 1 orient: +

T[81] edges: 14 blocks: 1 orient: -

14^t_{20} (1) 2^1 2 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	0.765366865	1.000000000	150
05	0.000000000	0.000000000	896
06	0.000000000	0.000000000	7199
07	0.000000000	0.000000000	41228
08	1.551390041	0.491818405	199112

T[66] edges: 14 blocks: 1 orient: +

T[74] edges: 14 blocks: 1 orient: -

14^t_{21} (1) 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	1.000000000	0.000000000	130
05	0.516569593	0.751736923	442
06	0.000000000	0.000000000	3601
07	0.546378793	-0.317967594	17192
08	1.079077039	0.000000000	74368

T[67] edges: 14 blocks: 1 orient: +

T[80] edges: 14 blocks: 1 orient: -

14^t_{22} (1) 2^1 2 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	0.765366865	1.000000000	150
05	0.000000000	0.000000000	864
06	1.000000000	1.000000000	6967
07	0.000000000	0.000000000	39592
08	1.475641911	0.494636265	190480

T[68] edges: 14 blocks: 1 orient: +

T[85] edges: 14 blocks: 1 orient: -

14^t_{23} (0) 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	150
05	0.444548571	-0.301750907	892
06	0.288675135	0.000000000	6987
07	0.902719679	-0.674594844	40320
08	0.388316007	0.000000000	192608

T[69] edges: 14 blocks: 1 orient: +

T[88] edges: 14 blocks: 1 orient: -

14^t_{24} (0) 2 blinks

T[71] edges: 14 blocks: 1 orient: +

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	166
05	0.221839804	0.000000000	732
06	0.288675135	0.000000000	6153
07	0.569807123	0.000000000	26280
08	0.658347954	0.000000000	118404

T[79] edges: 14 blocks: 1 orient: +

14^t_{25} (1) 1 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	8
04	1.000000000	0.000000000	188
05	0.180339888	1.000000000	1560
06	1.000000000	0.000000000	12071
07	1.344739004	0.000000000	69104
08	2.372583002	0.000000000	338240

T[73] edges: 14 blocks: 1 orient: +

14^t_{26} (1) 1 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	1.000000000	0.000000000	130
05	0.368810394	0.000000000	344
06	1.000000000	0.000000000	2917
07	1.010234949	0.000000000	9956
08	1.363348286	0.000000000	40334

T[75] edges: 14 blocks: 1 orient: +

14^t_{27} (0) 2^1 2 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	0.382683432	1.000000000	138
05	0.000000000	0.000000000	720
06	0.211324865	0.000000000	4973
07	0.000000000	0.000000000	24332
08	0.389854874	0.668408833	105252

T[77] edges: 14 blocks: 1 orient: +

T[87] edges: 14 blocks: 1 orient: -

14^t_{28} (1) 1 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	8
04	1.000000000	0.000000000	200
05	0.819660113	0.000000000	1624
06	2.000000000	0.000000000	13063
07	2.507030458	0.000000000	74032
08	3.117749006	0.000000000	367256

T[83] edges: 14 blocks: 1 orient: +

14^t_{29} (1) 2^1 2 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	0.765366865	1.000000000	142
05	0.000000000	0.000000000	720
06	0.517638090	-0.583333333	5105
07	0.000000000	0.000000000	24552
08	2.248193302	0.499484447	105560

T[84] edges: 14 blocks: 1 orient: +

T[98] edges: 14 blocks: 1 orient: -

14^t_{30} (1) 1 blinks

T[86] edges: 14 blocks: 1 orient: +

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	1.000000000	0.000000000	130
05	0.631189606	1.000000000	354
06	0.000000000	0.000000000	3015
07	1.043679128	1.000000000	10472
08	1.020202536	0.000000000	43544

14^t_{31} (1) 1 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	1.000000000	0.000000000	130
05	0.604878371	0.000000000	344
06	1.000000000	0.000000000	2917
07	2.105161001	0.000000000	9956
08	1.446609407	0.000000000	40334

T[89] edges: 14 blocks: 1 orient: +

14^t_{32} (0) 4^1 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.250000000	2
04	0.707106781	0.375000000	130
05	0.188343559	0.943128893	344
06	0.577350269	-0.333333333	2917
07	2.228800890	-0.037060545	9956
08	1.234263645	0.588840745	40334

T[90] edges: 14 blocks: 1 orient: +

T[93] edges: 14 blocks: 1 orient: -

14^t_{33} (0) 1 blinks

T[92] edges: 14 blocks: 1 orient: +

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	142
05	0.095670923	1.000000000	728
06	0.288675135	0.000000000	5137
07	1.678840085	0.000000000	25068
08	1.631954258	0.000000000	107632

14^t_{34} (1) 1 blinks

T[94] edges: 14 blocks: 1 orient: +

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	1.000000000	0.000000000	130
05	0.249223595	1.000000000	338
06	0.000000000	0.000000000	2855
07	0.938313253	0.000000000	9788
08	0.534921161	0.000000000	39560

14^t_{35} (1) 1 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	1.000000000	0.000000000	130
05	0.159053651	1.000000000	296
06	1.000000000	0.000000000	2655
07	1.289467145	0.000000000	6812
08	2.245599280	0.000000000	28522

T[97] edges: 14 blocks: 1 orient: +

14^t_{36} (1) 1 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	1.000000000	0.000000000	130
05	0.686917696	1.000000000	260
06	1.000000000	0.000000000	2449
07	2.622613419	0.000000000	4892
08	3.814141775	0.000000000	21534

T[102] edges: 14 blocks: 1 orient: +

15^t_1 (0) 5^1 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	-0.500000000	514
05	1.475107136	0.834849378	1326
06	0.288675135	1.000000000	23075
07	1.768822064	0.388634478	96144
08	2.277836180	0.250000000	579174

T[103] edges: 15 blocks: 1 orient: +

T[165] edges: 15 blocks: 1 orient: -

15^t_2 (0) 3^2 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	582
05	1.828329382	0.131560680	2948
06	0.866025404	0.000000000	43355
07	1.113572873	0.272133300	260448
08	3.573700098	0.000000000	1654236

T[104] edges: 15 blocks: 1 orient: +

T[189] edges: 15 blocks: 1 orient: -

15^t_3 (0) 3^1 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.500000000	2
04	0.500000000	-0.250000000	514
05	1.102656739	0.812233505	1436
06	0.500000000	-0.500000000	24949
07	1.617057587	0.701693015	106676
08	0.516332715	-0.375000000	657408

T[105] edges: 15 blocks: 1 orient: +

T[244] edges: 15 blocks: 1 orient: -

15^t_4 (0) 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	0.000000000	514
05	1.137841936	0.876797452	1454
06	0.288675135	0.000000000	25247
07	0.969594882	0.646094284	107972
08	0.551494852	0.000000000	667434

T[106] edges: 15 blocks: 1 orient: +

T[258] edges: 15 blocks: 1 orient: -

15^t_5 (1) 3^1 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	-0.500000000	4
04	1.000000000	-0.750000000	550
05	1.105190520	-0.622924619	3024
06	1.000000000	0.333333333	39627
07	1.175410380	0.238609927	255072
08	0.597979746	0.875000000	1568448

T[107] edges: 15 blocks: 1 orient: +

T[257] edges: 15 blocks: 1 orient: -

15^t_6 (0) 3^1 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	-0.500000000	2
04	0.500000000	-0.750000000	258
05	1.522477495	0.758980225	748
06	0.500000000	0.500000000	8863
07	0.917824638	-0.135773030	38852
08	0.849289376	0.875000000	196408

T[108] edges: 15 blocks: 1 orient: +

T[236] edges: 15 blocks: 1 orient: -

15^t_7 (0) 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	294
05	0.626523527	-0.169924730	1520
06	0.288675135	0.000000000	17041
07	1.026529222	-0.601939297	95880
08	0.641616039	1.000000000	538344

T[109] edges: 15 blocks: 1 orient: +

T[164] edges: 15 blocks: 1 orient: -

15^t_{8} (0) 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	1.000000000	258
05	0.745593922	-0.747779726	750
06	0.288675135	0.000000000	8717
07	1.623049050	-0.932007970	40032
08	1.022366678	-0.500000000	199422

T[116] edges: 15 blocks: 1 orient: +

T[124] edges: 15 blocks: 1 orient: -

15^t_{9} (0) 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	8
04	0.500000000	0.000000000	324
05	0.675231320	0.160554109	3320
06	0.288675135	0.000000000	31439
07	1.143355971	0.517484575	244800
08	0.295461436	1.000000000	1472840

T[111] edges: 15 blocks: 1 orient: +

T[152] edges: 15 blocks: 1 orient: -

15^t_{10} (0) 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	294
05	0.311870925	-0.139303917	1572
06	0.288675135	0.000000000	16337
07	1.397932602	-0.058741930	100396
08	2.102826084	0.000000000	543452

T[112] edges: 15 blocks: 1 orient: +

T[127] edges: 15 blocks: 1 orient: -

15^t_{11} (0) 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	294
05	0.311870925	-0.139303917	1484
06	0.288675135	0.000000000	16721
07	1.066379575	-0.618309971	93568
08	1.746538536	1.000000000	525820

T[113] edges: 15 blocks: 1 orient: +

T[125] edges: 15 blocks: 1 orient: -

15^t_{12} (1) 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	4
04	1.000000000	0.000000000	278
05	0.739065445	0.898249093	1540
06	0.000000000	0.000000000	15709
07	0.365306826	-0.282192950	95684
08	1.041630560	1.000000000	526504

T[114] edges: 15 blocks: 1 orient: +

T[136] edges: 15 blocks: 1 orient: -

15^t_{13} (0) 3^2 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	278
05	1.587155602	-0.383830823	1512
06	0.866025404	0.000000000	15597
07	0.754084434	-0.899318515	92476
08	3.259408146	1.000000000	508872

T[115] edges: 15 blocks: 1 orient: +

T[168] edges: 15 blocks: 1 orient: -

15^t_{14} (0) 3^1 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	-0.500000000	2
04	0.500000000	0.250000000	258
05	0.821226017	-0.811685450	698
06	0.500000000	0.500000000	8185
07	1.906427076	-0.820943929	35858
08	1.249836928	0.375000000	175850

T[116] edges: 15 blocks: 1 orient: +

T[162] edges: 15 blocks: 1 orient: -

15^t_{15} (0) 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	1.000000000	258
05	1.516461601	0.870272769	774
06	0.288675135	0.000000000	9053
07	0.534050888	-0.141055155	41622
08	0.546828674	-0.500000000	210914

T[117] edges: 15 blocks: 1 orient: +

T[175] edges: 15 blocks: 1 orient: -

15^t_{16} (0) 4 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	326
05	0.626523527	-0.169924730	1684
06	0.288675135	0.000000000	19341
07	0.271887719	-0.143082082	111440
08	0.116351265	1.000000000	620624

T[118] edges: 15 blocks: 1 orient: +

T[181] edges: 15 blocks: 1 orient: -

T[119] edges: 15 blocks: 1 orient: +

T[205] edges: 15 blocks: 1 orient: -

15^t_{17} (1) 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	8
04	1.000000000	0.000000000	348
05	1.261344369	-0.098340032	3320
06	1.000000000	0.000000000	35171
07	1.139294208	-0.372802509	260656
08	0.431457505	0.000000000	1615696

T[120] edges: 15 blocks: 1 orient: +

T[178] edges: 15 blocks: 1 orient: -

15^t_{18} (0) 3^1 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.500000000	2
04	0.500000000	0.250000000	258
05	0.117497699	-0.882577871	742
06	0.500000000	0.500000000	8641
07	0.490361044	-0.554302874	39236
08	0.325957395	0.375000000	194802

T[122] edges: 15 blocks: 1 orient: +

T[188] edges: 15 blocks: 1 orient: -

T[148] edges: 15 blocks: 1 orient: +

T[208] edges: 15 blocks: 1 orient: -

T[121] edges: 15 blocks: 1 orient: +

T[185] edges: 15 blocks: 1 orient: -

15^t_{19} (0) 4 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	326
05	1.180868794	-0.318489048	1664
06	0.288675135	0.000000000	18957
07	0.344363154	-0.282364319	108168
08	0.990504026	1.000000000	593752

15^t_{20} (1) 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	4
04	1.000000000	0.000000000	278
05	0.977964394	0.754684074	1500
06	0.000000000	0.000000000	15485
07	0.916402827	-0.189813708	92092
08	2.213203436	1.000000000	509144

T[123] edges: 15 blocks: 1 orient: +

T[218] edges: 15 blocks: 1 orient: -

15^t_{21} (0) 3^1 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	-0.500000000	2
04	0.500000000	-0.750000000	258
05	0.198805995	0.800924247	790
06	0.500000000	0.500000000	9151
07	0.795109871	-0.496835236	43058
08	0.466605943	0.875000000	217556

T[126] edges: 15 blocks: 1 orient: +

T[203] edges: 15 blocks: 1 orient: -

15^t_{22} (0) 4 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	326
05	0.943093903	-0.180036791	1680
06	0.288675135	0.000000000	20945
07	0.242490221	-0.482680140	111968
08	0.641616039	1.000000000	656072

T[128] edges: 15 blocks: 1 orient: +

T[186] edges: 15 blocks: 1 orient: -

T[141] edges: 15 blocks: 1 orient: +

T[206] edges: 15 blocks: 1 orient: -

15^t_{23} (0) 5^1 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	-0.500000000	258
05	0.701941669	-0.912986430	770
06	0.288675135	1.000000000	9029
07	1.270404161	-0.762193369	41120
08	0.418811966	-0.750000000	208710

T[129] edges: 15 blocks: 1 orient: +

T[173] edges: 15 blocks: 1 orient: -

15^t_{24} (0) 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	8
04	0.500000000	0.000000000	372
05	0.192397948	-0.934341190	3464
06	0.288675135	0.000000000	37495
07	0.410008025	0.028155760	272792
08	0.650948394	0.000000000	1701400

T[130] edges: 15 blocks: 1 orient: +

T[193] edges: 15 blocks: 1 orient: -

15^t_{25} (1) 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	16
04	1.000000000	0.000000000	496
05	1.209167465	0.088128758	7520
06	1.000000000	0.000000000	88853
07	1.424972209	0.305849958	787168
08	2.514718626	0.000000000	5556608

T[131] edges: 15 blocks: 1 orient: +

T[190] edges: 15 blocks: 1 orient: -

15^t_{26} (1) 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	4
04	1.000000000	0.000000000	278
05	0.553044205	0.437794976	1576
06	1.000000000	0.000000000	16113
07	1.633848588	0.085568510	97152
08	2.029437252	0.000000000	538140

T[132] edges: 15 blocks: 1 orient: +

T[191] edges: 15 blocks: 1 orient: -

15^t_{27} (0) 3^1 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.500000000	4
04	0.500000000	0.750000000	270
05	0.618532982	-0.551840632	1624
06	0.500000000	-0.500000000	14677
07	1.022470177	-0.425869127	98684
08	0.538863011	0.125000000	519340

T[133] edges: 15 blocks: 1 orient: +

T[204] edges: 15 blocks: 1 orient: -

15^{t}_{28} (0) 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	270
05	0.063149901	-0.414494598	1524
06	0.288675135	0.000000000	13925
07	0.351241815	0.584532732	90932
08	0.028162871	0.000000000	477788

T[134] edges: 15 blocks: 1 orient: +

T[196] edges: 15 blocks: 1 orient: -

15^{t}_{29} (0) 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	0.000000000	258
05	0.368398093	-0.877856396	806
06	0.288675135	0.000000000	9455
07	0.898411951	-0.711082033	43442
08	0.317991733	0.000000000	220512

T[135] edges: 15 blocks: 1 orient: +

T[221] edges: 15 blocks: 1 orient: -

15^{t}_{30} (0) 3^{1} 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	-0.500000000	2
04	0.500000000	0.250000000	258
05	0.484704763	-0.972141250	762
06	0.500000000	0.500000000	8925
07	0.897407426	-0.520542111	40450
08	0.418811966	0.375000000	202730

T[137] edges: 15 blocks: 1 orient: +

T[198] edges: 15 blocks: 1 orient: -

15^{t}_{31} (0) 3^{1} 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	-0.500000000	2
04	0.500000000	-0.750000000	258
05	0.836602494	0.993047513	782
06	0.500000000	0.500000000	9071
07	0.618311526	-0.382863897	42014
08	0.391615492	-0.125000000	210136

T[138] edges: 15 blocks: 1 orient: +

T[207] edges: 15 blocks: 1 orient: -

15^{t}_{32} (0) 4^{1} 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.250000000	4
04	0.707106781	0.375000000	294
05	0.487680795	-0.395168540	1600
06	0.577350269	0.333333333	17617
07	1.027517702	0.159755293	102348
08	1.364965805	0.511316637	572484

T[139] edges: 15 blocks: 1 orient: +

T[213] edges: 15 blocks: 1 orient: -

15^{t}_{33} (0) 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	270
05	0.699061057	-0.134623071	1584
06	0.288675135	0.000000000	14053
07	0.578024730	-0.094764478	93824
08	0.589956474	0.000000000	490448

T[140] edges: 15 blocks: 1 orient: +

T[228] edges: 15 blocks: 1 orient: -

15^{t}_{34} (0) 2^{1} 2 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	0.382683432	1.000000000	272
05	0.000000000	0.000000000	1556
06	0.788675135	1.000000000	15037
07	0.000000000	0.000000000	92544
08	0.501334151	-0.368319582	514232

T[142] edges: 15 blocks: 1 orient: +

T[222] edges: 15 blocks: 1 orient: -

15^{t}_{35} (0) 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	270
05	0.488742924	0.064603265	1704
06	0.288675135	0.000000000	16445
07	0.374531368	-0.194090096	106020
08	0.655614571	0.000000000	588128

T[143] edges: 15 blocks: 1 orient: +

T[226] edges: 15 blocks: 1 orient: -

15^{t}_{36} (1) 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	4
04	1.000000000	0.000000000	294
05	0.376535845	0.679867984	1576
06	1.000000000	0.333333333	17405
07	1.021665966	0.408886777	101048
08	2.615223689	0.000000000	566528

T[144] edges: 15 blocks: 1 orient: +

T[197] edges: 15 blocks: 1 orient: -

15^{t}_{37} (0) 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	0.000000000	258
05	1.175358907	-0.639975673	780
06	0.288675135	0.000000000	9187
07	0.298047498	-0.483317342	41958
08	0.223204368	1.000000000	214492

T[145] edges: 15 blocks: 1 orient: +

T[219] edges: 15 blocks: 1 orient: -

15^t_{38} (0) 3^1 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.500000000	2
04	0.500000000	-0.750000000	258
05	0.502884452	0.988432162	788
06	0.500000000	0.500000000	9157
07	0.349614033	-0.350519759	42524
08	0.756434805	0.875000000	214934

T[146] edges: 15 blocks: 1 orient: +

T[227] edges: 15 blocks: 1 orient: -

15^t_{39} (0) 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	272
05	0.386384295	0.055170341	1552
06	0.288675135	0.000000000	14513
07	0.500714015	0.080188524	92196
08	0.868520187	0.000000000	496128

T[147] edges: 15 blocks: 1 orient: +

T[212] edges: 15 blocks: 1 orient: -

15^t_{40} (0) 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	0.000000000	258
05	0.575440734	-0.513332866	796
06	0.288675135	0.000000000	9309
07	0.334850826	-0.386992833	43052
08	0.635017068	0.000000000	219726

T[149] edges: 15 blocks: 1 orient: +

T[225] edges: 15 blocks: 1 orient: -

15^t_{41} (1) 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	4
04	1.000000000	0.000000000	278
05	1.174634666	0.587729985	1536
06	0.000000000	0.000000000	14845
07	0.597020181	0.724206162	93488
08	0.526911935	1.000000000	495932

T[150] edges: 15 blocks: 1 orient: +

T[224] edges: 15 blocks: 1 orient: -

15^t_{42} (0) 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	0.000000000	258
05	0.209207671	-0.698578887	776
06	0.288675135	0.000000000	9025
07	0.849885501	-0.881742642	41168
08	0.028162871	0.000000000	205034

T[151] edges: 15 blocks: 1 orient: +

T[229] edges: 15 blocks: 1 orient: -

15^t_{43} (1) 3^1 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.500000000	4
04	1.000000000	0.750000000	278
05	2.042820471	0.913366438	1588
06	1.000000000	-0.333333333	14789
07	1.596981386	-0.136560662	94916
08	0.715728753	-0.875000000	496072

T[153] edges: 15 blocks: 1 orient: +

T[250] edges: 15 blocks: 1 orient: -

15^t_{44} (0) 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	0.000000000	258
05	0.614331549	-0.802978943	788
06	0.288675135	0.000000000	9157
07	1.284472900	-0.546447880	42524
08	0.700675165	0.000000000	214934

T[154] edges: 15 blocks: 1 orient: +

T[249] edges: 15 blocks: 1 orient: -

15^t_{45} (1) 3^1 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.500000000	4
04	1.000000000	0.750000000	278
05	1.190011694	0.922958507	1648
06	1.000000000	-0.333333333	15705
07	1.928447116	-0.094387705	100324
08	1.544155877	-0.875000000	538060

T[155] edges: 15 blocks: 1 orient: +

T[252] edges: 15 blocks: 1 orient: -

15^t_{46} (0) 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	0.000000000	258
05	0.741205753	-0.889000753	752
06	0.288675135	0.000000000	8827
07	0.975858332	-0.704335294	39296
08	0.410846304	0.000000000	195216

T[156] edges: 15 blocks: 1 orient: +

T[242] edges: 15 blocks: 1 orient: -

15^t_{47} (1) 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	4
04	1.000000000	0.000000000	278
05	1.354858412	0.502500516	1588
06	0.000000000	0.000000000	14789
07	1.392582375	0.297475314	94916
08	0.615223689	0.000000000	496072

T[157] edges: 15 blocks: 1 orient: +

T[256] edges: 15 blocks: 1 orient: -

15^t_{48} (0) 4^1 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.250000000	4
04	0.707106781	-0.875000000	160
05	0.909744982	0.092850525	1152
06	0.577350269	-0.333333333	11001
07	1.102465816	0.665648822	72360
08	1.301058596	0.683031381	396076

T[168] edges: 15 blocks: 1 orient: +

T[169] edges: 15 blocks: 1 orient: -

15^t_{49} (0) 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	0.000000000	258
05	0.715428889	-0.770800501	780
06	0.288675135	0.000000000	9187
07	0.905197935	-0.681889417	41958
08	0.569358971	0.000000000	214492

T[159] edges: 15 blocks: 1 orient: +

T[245] edges: 15 blocks: 1 orient: -

15^t_{50} (0) 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	0.000000000	258
05	0.715843290	-0.628389313	796
06	0.288675135	0.000000000	9309
07	0.595493675	-0.852189917	43052
08	0.793529736	0.000000000	219726

T[160] edges: 15 blocks: 1 orient: +

T[254] edges: 15 blocks: 1 orient: -

15^t_{51} (0) 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	1.000000000	258
05	0.163197604	-0.849846647	612
06	0.288675135	0.000000000	7621
07	0.419728086	0.930290531	24642
08	0.639683245	-0.500000000	121948

T[161] edges: 15 blocks: 1 orient: +

T[163] edges: 15 blocks: 1 orient: -

15^t_{52} (1) 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	4
04	1.000000000	0.000000000	278
05	0.729800665	0.330089111	1372
06	0.000000000	0.000000000	13127
07	0.626424685	0.325672008	64620
08	0.715728753	0.000000000	322904

T[166] edges: 15 blocks: 1 orient: +

T[240] edges: 15 blocks: 1 orient: -

15^t_{53} (0) 3^1 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	-0.500000000	8
04	0.500000000	-0.750000000	332
05	0.085643820	0.728007122	2704
06	0.500000000	0.500000000	26017
07	0.606373327	-0.421899954	160440
08	0.133649282	0.875000000	898672

T[167] edges: 15 blocks: 1 orient: +

T[182] edges: 15 blocks: 1 orient: -

15^t_{54} (1) 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	4
04	1.000000000	0.000000000	278
05	0.322849452	-0.955221074	1324
06	1.000000000	0.000000000	13587
07	0.672341166	0.094804251	63728
08	1.201010127	0.000000000	335324

T[170] edges: 15 blocks: 1 orient: +

T[180] edges: 15 blocks: 1 orient: -

15^t_{55} (1) 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	8
04	1.000000000	0.000000000	364
05	1.646965632	-0.047480458	2952
06	1.000000000	0.000000000	29309
07	1.051737454	-0.108211728	179624
08	1.259884630	0.000000000	1009728

T[171] edges: 15 blocks: 1 orient: +

T[239] edges: 15 blocks: 1 orient: -

15^t_{56} (0) 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	1.000000000	258
05	0.535045436	-0.884759802	630
06	0.288675135	0.000000000	7871
07	0.310371893	-0.629391690	25566
08	0.863854010	-0.500000000	128338

T[172] edges: 15 blocks: 1 orient: +

T[183] edges: 15 blocks: 1 orient: -

15^t_{57} (0) 4^1 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.250000000	4
04	0.707106781	0.875000000	278
05	0.256170429	-0.436771365	1332
06	1.154700538	0.000000000	13619
07	1.017198893	-0.039502631	64696
08	0.551892463	0.355652732	339020

T[174] edges: 15 blocks: 1 orient: +

T[211] edges: 15 blocks: 1 orient: -

15^{t}_{58} (1) 3^{1} 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.500000000	4
04	1.000000000	0.250000000	142
05	1.841145458	-0.836780357	872
06	1.000000000	0.666666667	6243
07	2.639925591	0.914822885	38596
08	2.916738879	0.375000000	179040

T[177] edges: 15 blocks: 1 orient: +

T[255] edges: 15 blocks: 1 orient: -

15^{t}_{59} (0) 3^{1} 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	-0.500000000	2
04	0.500000000	-0.750000000	258
05	0.692563274	0.838877901	668
06	0.500000000	0.500000000	8287
07	0.718875682	-0.365103758	27596
08	0.280896802	0.875000000	139918

T[179] edges: 15 blocks: 1 orient: +

T[247] edges: 15 blocks: 1 orient: -

15^{t}_{60} (0) 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	326
05	0.917188922	-0.071201704	1484
06	0.288675135	0.000000000	17475
07	0.387815798	-0.195760700	76808
08	0.069357877	0.000000000	422440

15^{t}_{61} (0) 3^{1} 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	-0.500000000	2
04	0.500000000	-0.750000000	258
05	0.948671201	-0.589884951	652
06	0.500000000	0.500000000	8055
07	0.291668206	0.668447232	27180
08	0.550128160	-0.125000000	137146

T[184] edges: 15 blocks: 1 orient: +

T[220] edges: 15 blocks: 1 orient: -

15^{t}_{62} (0) 3^{1} 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	-0.500000000	2
04	0.500000000	-0.750000000	258
05	0.795805236	-0.860937009	644
06	0.500000000	0.500000000	7975
07	0.517757653	-0.867733336	26432
08	0.484470063	-0.125000000	132158

T[187] edges: 15 blocks: 1 orient: +

T[223] edges: 15 blocks: 1 orient: -

15^{t}_{63} (0) 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	0.000000000	258
05	0.836709298	-0.624279713	684
06	0.288675135	0.000000000	8565
07	1.176412537	-0.786311543	28578
08	0.662213542	0.000000000	150740

T[192] edges: 15 blocks: 1 orient: +

T[259] edges: 15 blocks: 1 orient: -

15^{t}_{64} (0) 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	0.000000000	258
05	0.575440734	-0.513332866	642
06	0.288675135	0.000000000	8003
07	0.325843289	-0.215929297	26246
08	0.635017068	0.000000000	133302

T[194] edges: 15 blocks: 1 orient: +

T[248] edges: 15 blocks: 1 orient: -

15^{t}_{65} (0) 3^{1} 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.500000000	4
04	0.500000000	0.750000000	270
05	0.289164404	-0.960306351	1308
06	0.500000000	-0.500000000	12011
07	0.687795394	-0.064263381	60184
08	0.226503853	-0.875000000	295856

T[195] edges: 15 blocks: 1 orient: +

T[232] edges: 15 blocks: 1 orient: -

15^{t}_{66} (0) 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	1.000000000	258
05	0.532135320	-0.721876340	654
06	0.288675135	0.000000000	8073
07	0.259573971	-0.192575448	27356
08	0.481170578	-0.500000000	138392

T[199] edges: 15 blocks: 1 orient: +

T[230] edges: 15 blocks: 1 orient: -

15^{t}_{67} (0) 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	2
04	0.500000000	1.000000000	258
05	0.990203141	0.913022600	630
06	0.288675135	0.000000000	7871
07	0.235234424	0.001227848	25566
08	0.060025523	0.500000000	128338

T[200] edges: 15 blocks: 1 orient: +

T[209] edges: 15 blocks: 1 orient: -

15^t_{68} (0) 2 blinks

T[232] edges: 15 blocks: 1 orient: +

T[233] edges: 15 blocks: 1 orient: -

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	270
05	1.026403800	0.163256782	1320
06	0.288675135	0.000000000	11935
07	0.261306880	-0.579317670	60980
08	0.268264961	1.000000000	298132

15^t_{69} (0) 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	270
05	0.368967757	-0.234060417	1280
06	0.288675135	0.000000000	11759
07	0.436589333	-0.073593513	58884
08	0.196007893	1.000000000	289560

T[202] edges: 15 blocks: 1 orient: +

T[231] edges: 15 blocks: 1 orient: -

15^t_{70} (0) 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	270
05	0.504517357	-0.281336839	1356
06	0.288675135	0.000000000	12195
07	0.304139499	-0.354775840	62312
08	0.617152948	0.000000000	303900

T[210] edges: 15 blocks: 1 orient: +

T[246] edges: 15 blocks: 1 orient: -

15^t_{71} (0) 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	270
05	0.702223782	0.193176743	1400
06	0.288675135	0.000000000	12743
07	0.250531410	-0.249366902	66636
08	1.382519813	0.000000000	330684

T[214] edges: 15 blocks: 1 orient: +

T[251] edges: 15 blocks: 1 orient: -

15^t_{72} (1) 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	8
04	1.000000000	0.000000000	308
05	1.048564163	-0.147699105	2728
06	1.000000000	0.000000000	23529
07	0.660384807	-0.152457874	155200
08	0.715728753	0.000000000	839296

T[215] edges: 15 blocks: 1 orient: +

T[253] edges: 15 blocks: 1 orient: -

15^t_{73} (0) 3^1 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	-0.500000000	2
04	0.500000000	-0.750000000	258
05	0.890351724	-0.876548860	650
06	0.500000000	0.500000000	8045
07	0.488634400	0.390040318	26876
08	0.642982731	-0.125000000	135780

T[216] edges: 15 blocks: 1 orient: +

T[235] edges: 15 blocks: 1 orient: -

15^t_{74} (0) 3^1 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	-0.500000000	2
04	0.500000000	-0.750000000	258
05	0.215889365	-0.879412234	644
06	0.500000000	0.500000000	7975
07	0.899599883	-0.753956977	26432
08	0.439409469	0.875000000	132158

T[217] edges: 15 blocks: 1 orient: +

T[234] edges: 15 blocks: 1 orient: -

15^t_{75} (0) 3^1 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	-0.500000000	2
04	0.500000000	-0.750000000	258
05	0.594541236	-0.518028901	556
06	0.500000000	0.500000000	7301
07	0.332746044	-0.416713471	18156
08	0.122384134	0.875000000	95178

T[238] edges: 15 blocks: 1 orient: +

T[243] edges: 15 blocks: 1 orient: -

15^t_{76} (0) 3^1 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	-0.500000000	2
04	0.500000000	-0.750000000	258
05	0.593851504	-0.989703860	584
06	0.500000000	0.500000000	7641
07	0.242238401	0.245713562	19436
08	0.029529563	0.875000000	103966

T[241] edges: 15 blocks: 1 orient: +

T[260] edges: 15 blocks: 1 orient: -

16^t_1 (0) 4^2 2 blinks

r	mod	theta/pi	#sts
03	1.414213562	0.000000000	4
04	1.000000000	0.000000000	550
05	0.900403207	-0.407354158	2832
06	1.154700538	0.000000000	43363
07	3.457717774	0.493871368	249976
08	0.801316508	-0.321889916	1705612

T[261] edges: 16 blocks: 1 orient: +

T[306] edges: 16 blocks: 1 orient: -

16^t_2 (0) 2^1 2 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	2
04	0.923879533	-0.500000000	514
05	0.000000000	0.000000000	1326
06	0.912870929	-0.602416382	23075
07	0.000000000	0.000000000	96144
08	0.638125873	0.759828454	579174

T[384] edges: 16 blocks: 1 orient: -

16^t_3 (1) 4^1 2 blinks

r	mod	theta/pi	#sts
03	1.414213562	-0.250000000	4
04	1.414213562	-0.875000000	350
05	0.672850831	0.428067766	2900
06	1.732050808	0.500000000	38859
07	3.137122367	0.124288583	249724
08	3.130053037	-0.149803497	1547708

T[263] edges: 16 blocks: 1 orient: +

T[621] edges: 16 blocks: 1 orient: -

16^t_4 (1) 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	8
04	1.000000000	0.000000000	628
05	0.900693877	-0.324367653	5960
06	1.000000000	0.000000000	79853
07	0.813561196	0.231818128	626464
08	0.931024229	0.000000000	4482128

T[264] edges: 16 blocks: 1 orient: +

T[407] edges: 16 blocks: 1 orient: -

16^t_5 (1) 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	4
04	1.000000000	0.000000000	528
05	0.997657828	-0.246908270	2800
06	1.000000000	0.333333333	34311
07	0.931383102	0.085935035	223552
08	2.507575951	0.000000000	1362204

T[265] edges: 16 blocks: 1 orient: +

T[627] edges: 16 blocks: 1 orient: -

16^t_6 (0) 2^1 2 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	2
04	0.382683432	1.000000000	514
05	0.000000000	0.000000000	1544
06	0.211324865	0.000000000	26977
07	0.000000000	0.000000000	116414
08	1.300927719	-0.474250102	744756

T[266] edges: 16 blocks: 1 orient: +

T[703] edges: 16 blocks: 1 orient: -

16^t_7 (1) 1 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	0.000000000	0.000000000	258
05	0.252329215	0.000000000	906
06	0.000000000	0.000000000	10119
07	2.042850222	0.000000000	62770
08	0.243148301	0.000000000	329990

T[267] edges: 16 blocks: 1 orient: +

16^t_8 (0) 2^2 2 blinks

r	mod	theta/pi	#sts
03	1.414213562	0.000000000	4
04	0.707106781	-0.250000000	526
05	0.558509271	0.589394618	2956
06	0.577350269	-0.333333333	35147
07	2.994413064	-0.117454240	246236
08	2.704245820	0.046976516	1457436

T[268] edges: 16 blocks: 1 orient: +

T[477] edges: 16 blocks: 1 orient: -

16^t_9 (0) 2^1 2 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	2
04	0.923879533	0.500000000	514
05	0.000000000	0.000000000	1414
06	0.912870929	0.602416382	24767
07	0.000000000	0.000000000	103674
08	1.103227102	0.657675354	640834

T[269] edges: 16 blocks: 1 orient: +

T[629] edges: 16 blocks: 1 orient: -

16^t_{10} (0) 2^1 2 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	2
04	0.923879533	-0.500000000	514
05	0.000000000	0.000000000	1334
06	0.912870929	-0.602416382	23183
07	0.000000000	0.000000000	97322
08	0.417604439	-0.922849990	591190

T[270] edges: 16 blocks: 1 orient: +

T[412] edges: 16 blocks: 1 orient: -

16^t_{11} (1) 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	8
04	1.000000000	0.000000000	708
05	0.108117263	0.363081267	6624
06	1.000000000	0.000000000	93517
07	0.834954750	0.233957549	722848
08	2.019335984	0.000000000	5210784

T[271] edges: 16 blocks: 1 orient: +

T[658] edges: 16 blocks: 1 orient: -

16^t_{12} (0) 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	550
05	0.315070449	0.675632347	2804
06	0.288675135	0.000000000	40423
07	1.321290676	0.658295274	239836
08	0.715005312	0.000000000	1555380

T[273] edges: 16 blocks: 1 orient: +

T[411] edges: 16 blocks: 1 orient: -

16^t_{13} (1) 4^1 2 blinks

r	mod	theta/pi	#sts
03	1.414213562	-0.250000000	4
04	1.000000000	-0.025000000	550
05	0.741819160	-0.766985400	2740
06	1.732050808	0.500000000	39643
07	1.563250192	0.052011251	234228
08	1.333388883	-0.555265178	1519776

T[274] edges: 16 blocks: 1 orient: +

T[495] edges: 16 blocks: 1 orient: -

16^t_{14} (2) 2 blinks

r	mod	theta/pi	#sts
03	1.414213562	0.000000000	4
04	1.000000000	0.000000000	550
05	0.741819160	0.283014600	2924
06	1.732050808	0.000000000	41347
07	1.563250192	0.016296965	255836
08	1.333388883	-0.117765178	1650796

16^t_{15} (0) 2^1 2 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	2
04	0.923879533	-0.500000000	514
05	0.000000000	0.000000000	1418
06	0.912870929	-0.602416382	24467
07	0.000000000	0.000000000	106568
08	0.866052381	0.722474125	656402

T[275] edges: 16 blocks: 1 orient: +

T[512] edges: 16 blocks: 1 orient: -

16^t_{16} (0) 2^1 2 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	2
04	0.923879533	0.500000000	514
05	0.000000000	0.000000000	1436
06	0.211324865	0.000000000	24949
07	0.000000000	0.000000000	106676
08	0.625007078	0.582282141	657408

T[276] edges: 16 blocks: 1 orient: +

T[519] edges: 16 blocks: 1 orient: -

16^t_{17} (0) 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	8
04	0.500000000	0.000000000	680
05	0.421335302	0.076502000	6592
06	0.288675135	0.000000000	83749
07	0.940565110	0.247728273	694536
08	0.300127613	1.000000000	4772792

T[277] edges: 16 blocks: 1 orient: +

T[571] edges: 16 blocks: 1 orient: -

16^t_{18} (0) 2^1 2 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	8
04	0.382683432	1.000000000	644
05	0.000000000	0.000000000	6032
06	1.211324865	0.000000000	80777
07	0.000000000	0.000000000	646824
08	1.064750344	-0.473260461	4592168

T[278] edges: 16 blocks: 1 orient: +

T[500] edges: 16 blocks: 1 orient: -

16^t_{19} (1) 1 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	0.000000000	0.000000000	258
05	0.398227249	0.000000000	902
06	0.000000000	0.000000000	10037
07	0.605909733	0.000000000	62928
08	0.131526742	1.000000000	333660

T[279] edges: 16 blocks: 1 orient: +

16^t_{20} (1) 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	8
04	1.000000000	0.000000000	388
05	1.077014326	0.000000000	4152
06	1.000000000	0.000000000	48973
07	2.607743601	0.205095322	435104
08	1.304473783	0.000000000	2974248

T[280] edges: 16 blocks: 1 orient: +

T[292] edges: 16 blocks: 1 orient: -

16^t_{21} (1) 1 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	0.000000000	0.000000000	258
05	0.016261238	0.000000000	998
06	0.000000000	0.000000000	11243
07	0.452866517	0.000000000	72402
08	0.407578502	0.000000000	396790

T[281] edges: 16 blocks: 1 orient: +

16^t_{22} (0) 4^1 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.250000000	2
04	0.707106781	-0.375000000	258
05	1.253730175	-0.939827431	966
06	0.577350269	0.333333333	10707
07	0.313168824	0.520278946	68946
08	0.819653970	0.673760621	367574

T[293] edges: 16 blocks: 1 orient: -

16^t_{23} (1) 1 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	8
04	1.000000000	0.000000000	418
05	2.458980338	0.000000000	4632
06	1.000000000	0.000000000	55445
07	1.294261232	0.000000000	514592
08	3.079077039	0.000000000	3569376

T[283] edges: 16 blocks: 1 orient: +

16^t_{24} (0) 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	582
05	0.641112653	-0.533346552	2996
06	0.288675135	0.000000000	47479
07	0.596030703	0.561692377	271580
08	0.334254673	0.000000000	1836276

T[284] edges: 16 blocks: 1 orient: +

T[494] edges: 16 blocks: 1 orient: -

16^t_{25} (0) 8^1 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	-0.250000000	4
04	1.000000000	-0.625000000	528
05	0.635551931	0.940268136	2852
06	0.577350269	0.000000000	34843
07	0.925023237	0.053763811	232208
08	0.308657865	-0.437500000	1415332

T[285] edges: 16 blocks: 1 orient: +

T[511] edges: 16 blocks: 1 orient: -

16^t_{26} (0) 9^1 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	582
05	0.639436864	0.833230741	2948
06	0.500000000	-0.500000000	43355
07	0.490394926	-0.840240287	260448
08	1.366920102	0.000000000	1654236

T[286] edges: 16 blocks: 1 orient: +

T[518] edges: 16 blocks: 1 orient: -

16^t_{27} (0) 3^1 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	-0.500000000	4
04	0.500000000	-0.750000000	550
05	1.241183707	-0.916358823	3024
06	0.500000000	0.500000000	39627
07	0.366967677	-0.591595892	255072
08	0.308093276	0.875000000	1568448

T[287] edges: 16 blocks: 1 orient: +

T[608] edges: 16 blocks: 1 orient: -

16^t_{28} (0) 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	326
05	0.435766492	0.000000000	2100
06	0.288675135	0.000000000	25367
07	1.876637252	0.271407718	185164
08	0.393451158	0.000000000	1137024

T[288] edges: 16 blocks: 1 orient: +

T[294] edges: 16 blocks: 1 orient: -

16^t_{29} (0) 2^1 2 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	8
04	0.382683432	1.000000000	644
05	0.000000000	0.000000000	5880
06	0.211324865	0.000000000	82393
07	0.000000000	0.000000000	630952
08	0.168068690	0.348180488	4573792

T[289] edges: 16 blocks: 1 orient: +

T[509] edges: 16 blocks: 1 orient: -

16^t_{30} (2) 2^1 2 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	8
04	1.530733729	1.000000000	588
05	0.000000000	0.000000000	5904
06	1.674469342	-0.070146338	70493
07	0.000000000	0.000000000	593928
08	3.693954253	-0.509899006	4085368

T[290] edges: 16 blocks: 1 orient: +

T[501] edges: 16 blocks: 1 orient: -

16^t_{31} (0) 2^1 2 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	2
04	0.923879533	-0.500000000	514
05	0.000000000	0.000000000	1394
06	0.211324865	0.000000000	24131
07	0.000000000	0.000000000	102722
08	1.192219652	-0.564626088	623094

T[291] edges: 16 blocks: 1 orient: +

T[523] edges: 16 blocks: 1 orient: -

16^{t}_{32} (1) 2 blinks

T[256] edges: 16 blocks: 1 orient: +

T[409] edges: 16 blocks: 1 orient: -

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	0.000000000	0.000000000	258
05	0.503143826	0.478802114	970
06	0.000000000	0.000000000	10807
07	1.098044394	-0.098777433	69212
08	0.277219715	-0.787576275	370054

16^{t}_{33} (0) 2^{1} 2 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	2
04	0.923879533	0.500000000	514
05	0.000000000	0.000000000	1478
06	0.912870929	0.602416382	25373
07	0.000000000	0.000000000	112424
08	0.897394510	0.536482621	691548

T[296] edges: 16 blocks: 1 orient: +

T[576] edges: 16 blocks: 1 orient: -

16^{t}_{34} (1) 1 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	1.000000000	0.000000000	258
05	0.106431181	0.000000000	982
06	0.000000000	0.000000000	11083
07	0.030240959	0.000000000	70818
08	0.977197809	1.000000000	390342

T[297] edges: 16 blocks: 1 orient: +

16^{t}_{35} (0) 2^{1} 2 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	2
04	0.382683432	1.000000000	514
05	0.000000000	0.000000000	1414
06	0.788675135	1.000000000	24419
07	0.000000000	0.000000000	106088
08	1.093410792	-0.459712714	652110

T[298] edges: 16 blocks: 1 orient: +

T[601] edges: 16 blocks: 1 orient: -

16^{t}_{36} (3) 1 blinks

r	mod	theta/pi	#sts
03	2.000000000	0.000000000	8
04	4.000000000	0.000000000	348
05	3.390096630	0.000000000	4296
06	4.000000000	0.000000000	49965
07	4.378938155	0.000000000	447168
08	6.030303803	0.000000000	3109360

T[299] edges: 16 blocks: 1 orient: +

16^{t}_{37} (0) 2^{1} 2 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	8
04	0.382683432	1.000000000	692
05	0.000000000	0.000000000	6360
06	1.211324865	0.000000000	86769
07	0.000000000	0.000000000	679768
08	1.385610444	-0.501772015	4845184

T[300] edges: 16 blocks: 1 orient: +

T[528] edges: 16 blocks: 1 orient: -

16^{t}_{38} (3) 1 blinks

r	mod	theta/pi	#sts
03	2.000000000	0.000000000	32
04	4.000000000	0.000000000	1016
05	9.347524158	0.000000000	23360
06	15.000000000	0.000000000	378193
07	21.457563895	0.000000000	4484832
08	33.608081014	0.000000000	40764448

T[301] edges: 16 blocks: 1 orient: +

16^{t}_{39} (1) 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	0.000000000	0.000000000	258
05	1.559495855	0.187227673	966
06	1.000000000	0.000000000	10707
07	0.183489302	-0.472575618	68946
08	0.691027852	-0.234623854	367574

T[302] edges: 16 blocks: 1 orient: +

T[396] edges: 16 blocks: 1 orient: -

16^{t}_{40} (0) 2^{1} 2 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	2
04	0.923879533	-0.500000000	514
05	0.000000000	0.000000000	1454
06	0.912870929	-0.602416382	25199
07	0.000000000	0.000000000	109718
08	0.491880809	-0.829016038	681466

T[303] edges: 16 blocks: 1 orient: +

T[502] edges: 16 blocks: 1 orient: -

16^{t}_{41} (1) 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	8
04	1.000000000	0.000000000	356
05	1.249042228	0.093934688	4000
06	2.000000000	0.000000000	49393
07	1.167429750	0.022595970	419368
08	0.115656965	0.000000000	2966376

T[304] edges: 16 blocks: 1 orient: +

T[433] edges: 16 blocks: 1 orient: -

16^t_{42} (0) 2^2 4 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	1.224744871	0.195913276	294
05	0.000000000	0.000000000	1900
06	0.577350269	-0.333333333	22883
07	0.000000000	0.000000000	159992
08	1.774989898	0.206598266	1001208

16^t_{43} (0) 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	646
05	0.429861491	0.939141888	3212
06	0.288675135	0.000000000	52943
07	0.154740804	0.346253539	296064
08	1.217739789	0.000000000	1982628

T[307] edges: 16 blocks: 1 orient: +

T[634] edges: 16 blocks: 1 orient: -

16^t_{44} (0) 2^1 2 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	2
04	0.382683432	1.000000000	514
05	0.000000000	0.000000000	1502
06	0.912870929	0.602416382	26321
07	0.000000000	0.000000000	114006
08	1.234197087	-0.476982283	740252

T[308] edges: 16 blocks: 1 orient: +

T[704] edges: 16 blocks: 1 orient: -

16^t_{45} (0) 2^1 2 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	2
04	0.382683432	1.000000000	514
05	0.000000000	0.000000000	1480
06	0.912870929	-0.602416382	25885
07	0.000000000	0.000000000	110782
08	0.268495934	0.439096412	700176

T[309] edges: 16 blocks: 1 orient: +

T[677] edges: 16 blocks: 1 orient: -

16^t_{46} (0) 2^1 2 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	8
04	0.382683432	1.000000000	584
05	0.000000000	0.000000000	5920
06	0.912870929	-0.602416382	69293
07	0.000000000	0.000000000	593016
08	0.553526232	0.446269588	4072504

T[310] edges: 16 blocks: 1 orient: +

T[584] edges: 16 blocks: 1 orient: -

16^t_{47} (0) 2^1 2 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	2
04	0.923879533	0.500000000	514
05	0.000000000	0.000000000	1454
06	0.211324865	0.000000000	24845
07	0.000000000	0.000000000	110726
08	0.913742132	0.478042887	680564

T[311] edges: 16 blocks: 1 orient: +

T[610] edges: 16 blocks: 1 orient: -

16^t_{48} (1) 2^1 2 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	1.847759065	-0.500000000	294
05	0.000000000	0.000000000	2084
06	1.414213562	0.750000000	23675
07	0.000000000	0.000000000	181688
08	1.217525596	-0.176223578	1131192

T[312] edges: 16 blocks: 1 orient: +

T[399] edges: 16 blocks: 1 orient: -

16^t_{49} (1) 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	0.000000000	0.000000000	258
05	1.148963898	0.143937875	966
06	1.000000000	0.000000000	10707
07	0.464995771	0.361932470	68946
08	0.874355688	-0.937130800	367574

T[313] edges: 16 blocks: 1 orient: +

T[400] edges: 16 blocks: 1 orient: -

16^t_{50} (1) 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	8
04	1.000000000	0.000000000	388
05	0.890544128	0.133745971	4440
06	1.000000000	0.000000000	51265
07	1.277077908	0.078417085	473904
08	0.760317906	0.000000000	3258000

T[314] edges: 16 blocks: 1 orient: +

T[465] edges: 16 blocks: 1 orient: -

16^t_{51} (0) 2^1 2 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	2
04	0.382683432	1.000000000	514
05	0.000000000	0.000000000	1372
06	0.788675135	1.000000000	23995
07	0.000000000	0.000000000	100376
08	0.700420852	-0.493535720	618006

T[315] edges: 16 blocks: 1 orient: +

T[602] edges: 16 blocks: 1 orient: -

16^t_{52} (0) 2^1 2 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	0.382683432	1.000000000	272
05	0.000000000	0.000000000	1952
06	0.211324865	0.000000000	18491
07	0.000000000	0.000000000	153568
08	0.073300262	0.399853563	915336

T[441] edges: 16 blocks: 1 orient: -

16^t_{53} (0) 9^1 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	390
05	1.254795187	0.200450680	2264
06	0.500000000	-0.500000000	30819
07	0.917014567	-0.108188274	202440
08	0.739468403	1.000000000	1262752

T[317] edges: 16 blocks: 1 orient: +

T[446] edges: 16 blocks: 1 orient: -

16^t_{54} (0) 2^1 2 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	2
04	0.382683432	1.000000000	514
05	0.000000000	0.000000000	1544
06	0.912870929	-0.602416382	26977
07	0.000000000	0.000000000	116414
08	0.162325336	-0.170530864	744756

T[318] edges: 16 blocks: 1 orient: +

T[706] edges: 16 blocks: 1 orient: -

16^t_{55} (0) 2^1 2 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	2
04	0.923879533	0.500000000	514
05	0.000000000	0.000000000	1490
06	0.211324865	0.000000000	25577
07	0.000000000	0.000000000	113834
08	0.916196379	0.438883741	705632

T[319] edges: 16 blocks: 1 orient: +

T[611] edges: 16 blocks: 1 orient: -

16^t_{56} (1) 4 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	8
04	1.000000000	0.000000000	420
05	1.249042228	0.093934688	4512
06	2.000000000	0.000000000	61009
07	1.748655511	-0.081646235	501032
08	0.801948466	0.000000000	3620288

T[320] edges: 16 blocks: 1 orient: +

T[405] edges: 16 blocks: 1 orient: -

T[357] edges: 16 blocks: 1 orient: +

T[421] edges: 16 blocks: 1 orient: -

16^t_{57} (0) 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	8
04	0.500000000	0.000000000	360
05	0.563415284	-0.154313896	4240
06	0.288675135	0.000000000	47517
07	0.673049259	-0.521680091	436064
08	0.016897723	0.000000000	3017320

T[321] edges: 16 blocks: 1 orient: +

T[471] edges: 16 blocks: 1 orient: -

16^t_{58} (0) 4^1 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.250000000	8
04	0.707106781	0.375000000	452
05	0.691186872	-0.806466582	4944
06	0.577350269	-0.333333333	68193
07	1.149913643	-0.339852105	556648
08	0.148229221	0.029087079	4043000

T[322] edges: 16 blocks: 1 orient: +

T[440] edges: 16 blocks: 1 orient: -

16^t_{59} (1) 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	8
04	1.000000000	0.000000000	708
05	0.746815910	-0.054068341	6752
06	1.000000000	0.000000000	97773
07	0.488804170	-0.089084307	756064
08	0.705627485	0.000000000	5501288

T[323] edges: 16 blocks: 1 orient: +

T[657] edges: 16 blocks: 1 orient: -

16^t_{60} (0) 3^1 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.500000000	4
04	0.500000000	-0.250000000	528
05	0.561674910	-0.174576802	2980
06	0.500000000	-0.500000000	37547
07	0.974071396	0.590338013	245920
08	0.801495399	-0.375000000	1576256

T[324] edges: 16 blocks: 1 orient: +

T[543] edges: 16 blocks: 1 orient: -

16^t_{61} (0) 2^1 2 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	2
04	0.382683432	1.000000000	514
05	0.000000000	0.000000000	1438
06	0.912870929	-0.602416382	24835
07	0.000000000	0.000000000	109268
08	0.117015769	0.591324322	687378

T[325] edges: 16 blocks: 1 orient: +

T[609] edges: 16 blocks: 1 orient: -

16^t_{62} (1) 2 blinks

T[448] edges: 16 blocks: 1 orient: -

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	1.000000000	0.000000000	258
05	0.813628308	0.788337964	964
06	0.000000000	0.000000000	10721
07	0.260761437	0.932069116	68640
08	0.105048083	1.000000000	365272

16^t_{63} (0) 4^1 2 blinks

T[327] edges: 16 blocks: 1 orient: +

T[443] edges: 16 blocks: 1 orient: -

r	mod	theta/pi	#sts
03	1.000000000	0.250000000	2
04	0.707106781	0.875000000	258
05	1.633415888	-0.733379037	966
06	0.577350269	-0.333333333	10707
07	0.463254164	-0.777682635	68946
08	0.885117203	0.389032145	367574

16^t_{64} (0) 2^1 2 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	2
04	0.923879533	0.500000000	514
05	0.000000000	0.000000000	1436
06	0.912870929	0.602416382	24949
07	0.000000000	0.000000000	106676
08	0.486547537	0.545890658	657408

T[328] edges: 16 blocks: 1 orient: +

T[542] edges: 16 blocks: 1 orient: -

16^t_{65} (0) 2 blinks

T[329] edges: 16 blocks: 1 orient: +

T[472] edges: 16 blocks: 1 orient: -

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	8
04	0.500000000	0.000000000	372
05	0.658724496	-0.021305160	4184
06	0.288675135	0.000000000	47245
07	0.536972730	-0.187019892	427240
08	1.110555071	0.000000000	2964808

16^t_{66} (1) 1 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	1.000000000	0.000000000	258
05	0.859126965	1.000000000	926
06	1.000000000	0.000000000	10531
07	1.794350907	0.000000000	65086
08	2.948775786	0.000000000	357942

T[330] edges: 16 blocks: 1 orient: +

16^t_{67} (0) 2^1 2 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	2
04	0.382683432	1.000000000	514
05	0.000000000	0.000000000	1408
06	0.788675135	1.000000000	24373
07	0.000000000	0.000000000	104524
08	0.894904414	-0.514920332	642112

T[331] edges: 16 blocks: 1 orient: +

T[612] edges: 16 blocks: 1 orient: -

16^t_{68} (0) 2 blinks

T[332] edges: 16 blocks: 1 orient: +

T[661] edges: 16 blocks: 1 orient: -

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	550
05	0.184998480	-0.191996241	3040
06	0.288675135	0.000000000	45907
07	0.186659843	0.545173518	271088
08	0.538628524	0.000000000	1853100

16^t_{69} (1) 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	4
04	1.000000000	0.000000000	528
05	1.114856669	0.098121917	2896
06	1.000000000	-0.333333333	35527
07	0.822155195	-0.502817649	233924
08	0.580735804	0.000000000	1434884

T[333] edges: 16 blocks: 1 orient: +

T[666] edges: 16 blocks: 1 orient: -

16^t_{70} (0) 2^1 2 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	2
04	0.382683432	1.000000000	514
05	0.000000000	0.000000000	1468
06	0.912870929	0.602416382	25083
07	0.000000000	0.000000000	112540
08	0.499207650	0.332886269	699290

T[334] edges: 16 blocks: 1 orient: +

T[682] edges: 16 blocks: 1 orient: -

16^t_{71} (0) 2^1 2 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	2
04	0.382683432	1.000000000	514
05	0.000000000	0.000000000	1448
06	0.912870929	0.602416382	24799
07	0.000000000	0.000000000	109160
08	0.705998668	-0.412942716	670566

T[335] edges: 16 blocks: 1 orient: +

T[688] edges: 16 blocks: 1 orient: -

16^t_{72} (0) 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	8
04	0.500000000	0.000000000	608
05	0.923171276	-0.219401506	6024
06	0.288675135	0.000000000	78237
07	0.172989398	-0.027039997	630408
08	1.042964181	0.000000000	4479072

T[338] edges: 16 blocks: 1 orient: +

T[692] edges: 16 blocks: 1 orient: -

16^t_{73} (1) 2^1 2 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	8
04	0.765367865	1.000000000	596
05	0.000000000	0.000000000	6192
06	0.000000000	0.000000000	72665
07	0.000000000	0.000000000	618608
08	1.238581764	0.535721261	4231976

T[339] edges: 16 blocks: 1 orient: +

T[651] edges: 16 blocks: 1 orient: -

16^t_{74} (0) 2^1 2 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	2
04	0.382683432	1.000000000	514
05	0.000000000	0.000000000	1372
06	0.912870929	-0.602416382	23995
07	0.000000000	0.000000000	100376
08	0.714724605	-0.362356848	618006

16^t_{75} (1) 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	4
04	1.000000000	0.000000000	534
05	0.851092361	-0.150800934	3016
06	1.000000000	0.333333333	38375
07	0.761419713	0.203809584	254232
08	0.892352262	0.000000000	1573584

T[340] edges: 16 blocks: 1 orient: +

T[691] edges: 16 blocks: 1 orient: -

16^t_{76} (0) 2^1 2 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	2
04	0.382683432	1.000000000	514
05	0.000000000	0.000000000	1510
06	0.912870929	0.602416382	26125
07	0.000000000	0.000000000	115730
08	0.808382127	-0.460768015	728748

T[341] edges: 16 blocks: 1 orient: +

T[690] edges: 16 blocks: 1 orient: -

16^t_{77} (0) 2^1 2 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	2
04	0.382683432	1.000000000	514
05	0.000000000	0.000000000	1408
06	0.912870929	-0.602416382	24373
07	0.000000000	0.000000000	104524
08	0.786888369	-0.377301212	642112

T[342] edges: 16 blocks: 1 orient: +

T[664] edges: 16 blocks: 1 orient: -

16^t_{78} (0) 2^1 2 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	2
04	0.382683432	1.000000000	514
05	0.000000000	0.000000000	1448
06	0.211324865	0.000000000	24799
07	0.000000000	0.000000000	109160
08	1.759893055	-0.459704681	670566

T[343] edges: 16 blocks: 1 orient: +

T[694] edges: 16 blocks: 1 orient: -

16^t_{79} (1) 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	8
04	1.000000000	0.000000000	336
05	0.412322515	0.343153737	4240
06	0.000000000	0.000000000	47677
07	0.860334494	0.899508335	432264
08	0.509667992	1.000000000	3001232

T[344] edges: 16 blocks: 1 orient: +

T[455] edges: 16 blocks: 1 orient: -

16^t_{80} (1) 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	1.000000000	0.000000000	258
05	0.086155278	0.210914604	964
06	1.000000000	-0.333333333	10851
07	1.429790678	-0.402450904	67044
08	0.156779911	1.000000000	352830

T[345] edges: 16 blocks: 1 orient: +

T[436] edges: 16 blocks: 1 orient: -

16^t_{81} (0) 4^1 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.250000000	2
04	0.707106781	0.375000000	258
05	0.572492549	0.007223881	1030
06	0.577350269	0.333333333	11521
07	0.274277893	-0.303504908	74916
08	0.211970659	0.342314718	406316

T[346] edges: 16 blocks: 1 orient: +

T[513] edges: 16 blocks: 1 orient: -

16^t_{82} (1) 2 blinks

T[347] edges: 16 blocks: 1 orient: +

T[432] edges: 16 blocks: 1 orient: -

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	1.000000000	0.000000000	258
05	0.326112662	-0.084700878	964
06	1.000000000	-0.333333333	10771
07	0.422092734	-0.597421046	68326
08	0.301007576	1.000000000	366002

16^t_{83} (0) 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	534
05	0.521739201	0.405675654	2952
06	0.288675135	0.000000000	38995
07	0.566537996	0.465718283	247972
08	0.384782034	0.000000000	1575412

T[348] edges: 16 blocks: 1 orient: +

T[671] edges: 16 blocks: 1 orient: -

16^t_{84} (1) 4^1 2 blinks

r	mod	theta/pi	#sts
03	1.414213562	-0.250000000	4
04	1.414213562	-0.375000000	550
05	0.561712465	-0.025632347	3024
06	1.000000000	0.000000000	39627
07	1.542019889	-0.278641287	255072
08	2.772392528	-0.538478828	1568448

T[349] edges: 16 blocks: 1 orient: +

T[693] edges: 16 blocks: 1 orient: -

16^t_{85} (1) 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	1.000000000	0.000000000	258
05	0.869221848	0.684972979	950
06	0.000000000	0.000000000	10661
07	0.454464872	0.880289363	66254
08	0.825827469	1.000000000	351376

T[350] edges: 16 blocks: 1 orient: +

T[517] edges: 16 blocks: 1 orient: -

16^t_{86} (0) 4^1 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.250000000	2
04	0.707106781	0.375000000	258
05	0.168979790	-0.967062535	996
06	0.577350269	1.000000000	11257
07	0.806570941	-0.668859765	71138
08	1.055901081	-0.425311223	383468

T[351] edges: 16 blocks: 1 orient: +

T[503] edges: 16 blocks: 1 orient: -

16^t_{87} (0) 2^1 2 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	2
04	0.382683432	1.000000000	514
05	0.000000000	0.000000000	1454
06	0.912870929	0.602416382	25247
07	0.000000000	0.000000000	107972
08	0.303618191	0.060642571	667434

T[352] edges: 16 blocks: 1 orient: +

T[680] edges: 16 blocks: 1 orient: -

16^t_{88} (1) 2^1 2 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	8
04	0.765366865	1.000000000	596
05	0.000000000	0.000000000	6192
06	0.000000000	0.000000000	71353
07	0.000000000	0.000000000	613776
08	2.550485806	0.506394998	4135872

T[353] edges: 16 blocks: 1 orient: +

T[697] edges: 16 blocks: 1 orient: -

16^t_{89} (0) 4^1 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	-0.250000000	2
04	0.707106781	-0.875000000	258
05	0.145453388	0.678829123	996
06	1.154700538	0.000000000	11257
07	1.762261658	-0.355673053	71138
08	0.918743975	0.783374512	383468

T[354] edges: 16 blocks: 1 orient: +

T[498] edges: 16 blocks: 1 orient: -

16^t_{90} (2) 2 blinks

r	mod	theta/pi	#sts
03	1.414213562	0.000000000	8
04	2.000000000	0.000000000	332
05	2.235248155	-0.012551080	4400
06	2.000000000	-0.166666667	48337
07	2.455762189	-0.188777720	449976
08	2.101059098	0.000000000	3144992

T[355] edges: 16 blocks: 1 orient: +

T[521] edges: 16 blocks: 1 orient: -

16^t_{91} (0) 4^1 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.250000000	8
04	0.707106781	0.375000000	344
05	0.691186872	-0.806466582	4368
06	0.577350269	-0.333333333	49205
07	1.158728487	-0.303579827	457144
08	1.022111789	-0.379290227	3183312

T[356] edges: 16 blocks: 1 orient: +

T[484] edges: 16 blocks: 1 orient: -

16^t_{92} (0) 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	534
05	0.501881706	-0.401823181	3072
06	0.288675135	0.000000000	40255
07	0.511825257	-0.303186382	264832
08	0.326191883	1.000000000	1685200

T[358] edges: 16 blocks: 1 orient: +

T[679] edges: 16 blocks: 1 orient: -

16^t_{93} (0) 2^1 2 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	2
04	0.923879533	0.500000000	514
05	0.000000000	0.000000000	1508
06	0.912870929	0.602416382	25915
07	0.000000000	0.000000000	116216
08	0.094374608	0.450937420	733386

T[359] edges: 16 blocks: 1 orient: +

T[696] edges: 16 blocks: 1 orient: -

16^t_{94} (1) 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	8
04	1.000000000	0.000000000	596
05	1.545135630	0.002577542	6248
06	2.000000000	0.000000000	75249
07	1.863769401	0.160845351	645904
08	1.492424049	0.000000000	4468960

T[360] edges: 16 blocks: 1 orient: +

T[689] edges: 16 blocks: 1 orient: -

16^t_{95} (0) 2^1 2 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	2
04	0.923879533	0.500000000	514
05	0.000000000	0.000000000	1436
06	0.788675135	1.000000000	24949
07	0.000000000	0.000000000	106676
08	0.985337918	0.311930501	657408

T[361] edges: 16 blocks: 1 orient: +

T[672] edges: 16 blocks: 1 orient: -

16^t_{96} (1) 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	4
04	1.000000000	0.000000000	534
05	0.534986917	0.291247584	3100
06	1.000000000	-0.333333333	39699
07	1.897697743	-0.066227575	265320
08	1.953318806	0.000000000	1664720

T[362] edges: 16 blocks: 1 orient: +

T[695] edges: 16 blocks: 1 orient: -

16^t_{97} (0) 2^1 2 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	2
04	0.382683432	1.000000000	514
05	0.000000000	0.000000000	1436
06	0.211324865	0.000000000	24817
07	0.000000000	0.000000000	108922
08	0.974871571	-0.524094378	684920

T[363] edges: 16 blocks: 1 orient: +

T[659] edges: 16 blocks: 1 orient: -

16^t_{98} (0) 2^1 2 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	2
04	0.382683432	1.000000000	514
05	0.000000000	0.000000000	1408
06	0.912870929	-0.602416382	24373
07	0.000000000	0.000000000	104524
08	0.227501168	-0.174788757	642112

T[364] edges: 16 blocks: 1 orient: +

T[660] edges: 16 blocks: 1 orient: -

16^t_{99} (1) 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	4
04	1.000000000	0.000000000	534
05	0.926193155	-0.105918752	2932
06	1.000000000	0.333333333	38555
07	0.404971102	0.522999050	246312
08	0.036579926	1.000000000	1557988

T[365] edges: 16 blocks: 1 orient: +

T[698] edges: 16 blocks: 1 orient: -

16^t_{100} (1) 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	1.000000000	0.000000000	258
05	0.737358413	0.238388308	1070
06	1.000000000	0.000000000	12695
07	0.760679071	-0.011037724	78754
08	1.222945766	0.000000000	460946

T[366] edges: 16 blocks: 1 orient: +

T[544] edges: 16 blocks: 1 orient: -

16^t_{101} (1) 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	1.000000000	0.000000000	258
05	0.168608821	0.307675480	990
06	1.000000000	0.000000000	11215
07	1.037621641	-0.272820779	71000
08	0.865514665	0.000000000	389110

T[367] edges: 16 blocks: 1 orient: +

T[459] edges: 16 blocks: 1 orient: -

16^t_{102} (1) 2^1 2 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	0.765366865	1.000000000	294
05	0.000000000	0.000000000	2100
06	0.732050808	0.000000000	23947
07	0.000000000	0.000000000	183148
08	1.070854235	0.584339235	1147624

T[368] edges: 16 blocks: 1 orient: +

T[493] edges: 16 blocks: 1 orient: -

16^t_{103} (0) 3^1 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	-0.500000000	4
04	0.500000000	-0.750000000	280
05	0.661390947	-0.235419135	1992
06	0.500000000	0.500000000	21483
07	0.603806787	-0.178058538	162392
08	0.090521482	0.875000000	1020184

T[369] edges: 16 blocks: 1 orient: +

T[457] edges: 16 blocks: 1 orient: -

16^t_{104} (0) 4^1 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.250000000	2
04	0.707106781	0.375000000	258
05	0.705916172	-0.255932440	1034
06	0.577350269	0.333333333	11879
07	0.190543354	-0.418404495	75382
08	0.789349826	0.341690449	421962

T[370] edges: 16 blocks: 1 orient: +

T[510] edges: 16 blocks: 1 orient: -

16^t_{105} (0) 4^1 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.250000000	2
04	0.707106781	0.375000000	258
05	0.823911767	-0.770685706	970
06	0.577350269	-0.333333333	10807
07	1.072643073	-0.053543540	69212
08	0.234544591	0.997084172	370054

T[371] edges: 16 blocks: 1 orient: +

T[422] edges: 16 blocks: 1 orient: -

16^t_{106} (0) 2^1 2 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	0.382683432	1.000000000	278
05	0.000000000	0.000000000	2156
06	0.912870929	0.602416382	23607
07	0.000000000	0.000000000	180724
08	0.318293251	-0.417571786	1135568

T[372] edges: 16 blocks: 1 orient: +

T[520] edges: 16 blocks: 1 orient: -

16^t_{107} (0) 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	326
05	0.371487688	0.302095264	2132
06	0.288675135	0.000000000	23923
07	0.393360637	-0.020548073	187872
08	0.252802610	0.000000000	1126780

T[373] edges: 16 blocks: 1 orient: +

T[442] edges: 16 blocks: 1 orient: -

16^t_{108} (1) 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	1.000000000	0.000000000	258
05	0.453809691	0.901089170	990
06	1.000000000	0.000000000	11215
07	1.495959280	0.091751783	71000
08	1.588386093	0.000000000	389110

T[374] edges: 16 blocks: 1 orient: +

T[516] edges: 16 blocks: 1 orient: -

16^t_{109} (0) 4^1 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.250000000	2
04	0.707106781	0.375000000	258
05	0.763140425	0.635781556	1022
06	0.577350269	1.000000000	11489
07	1.267382097	-0.418537033	73364
08	1.254893001	-0.434432202	396180

T[375] edges: 16 blocks: 1 orient: +

T[522] edges: 16 blocks: 1 orient: -

16^t_{110} (0) 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	294
05	0.612995846	-0.254762954	2012
06	0.288675135	0.000000000	21419
07	0.379695794	-0.773635163	166328
08	0.109752294	0.000000000	989880

T[376] edges: 16 blocks: 1 orient: +

T[430] edges: 16 blocks: 1 orient: -

16^t_{111} (0) 4^1 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.250000000	2
04	0.707106781	0.375000000	258
05	0.258731026	-0.117147302	980
06	0.577350269	1.000000000	11073
07	1.331573187	-0.283361122	68864
08	1.109517346	-0.388359569	366256

T[377] edges: 16 blocks: 1 orient: +

T[637] edges: 16 blocks: 1 orient: -

16^t_{112} (2) 2 blinks

r	mod	theta/pi	#sts
03	1.414213562	0.000000000	8
04	2.000000000	0.000000000	324
05	2.574770533	0.043266666	4304
06	1.000000000	-0.166666667	46353
07	4.072920701	-0.231971999	430864
08	4.265843498	0.000000000	3006952

T[378] edges: 16 blocks: 1 orient: +

T[642] edges: 16 blocks: 1 orient: -

16^t_{113} (0) 4^1 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.250000000	2
04	0.707106781	0.375000000	258
05	1.154896484	-0.253625999	970
06	0.577350269	0.333333333	10807
07	0.725898295	-0.210217560	69212
08	0.356167484	-0.207587467	370054

T[379] edges: 16 blocks: 1 orient: +

T[649] edges: 16 blocks: 1 orient: -

16^t_{114} (0) 4^1 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.250000000	2
04	0.707106781	0.375000000	258
05	0.561633512	-0.663492147	1012
06	0.577350269	-0.333333333	11303
07	1.815200105	-0.122107334	72414
08	0.388907631	0.515550382	386778

T[380] edges: 16 blocks: 1 orient: +

T[655] edges: 16 blocks: 1 orient: -

16^t_{115} (1) 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	0.000000000	0.000000000	258
05	1.172623931	0.301103534	698
06	1.000000000	0.333333333	8327
07	0.064587572	0.682124072	35462
08	1.213898644	0.802071108	176486

T[381] edges: 16 blocks: 1 orient: +

T[475] edges: 16 blocks: 1 orient: -

16^t_{116} (2) 2 blinks

r	mod	theta/pi	#sts
03	1.414213562	0.000000000	8
04	2.000000000	0.000000000	316
05	2.466214183	-0.190568611	3064
06	2.645751311	-0.060518859	29291
07	2.233101008	-0.392297325	224488
08	3.125192762	1.000000000	1365784

T[382] edges: 16 blocks: 1 orient: +

T[643] edges: 16 blocks: 1 orient: -

16^t_{117} (1) 1 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	0.000000000	0.000000000	258
05	0.196601125	0.000000000	716
06	0.000000000	0.000000000	8449
07	0.474890796	0.000000000	36852
08	0.032036907	0.000000000	182374

T[383] edges: 16 blocks: 1 orient: +

16^t_{118} (0) 2^2 2 blinks

r	mod	theta/pi	#sts
03	1.414213562	0.000000000	4
04	0.707106781	0.250000000	534
05	1.180044768	0.280272849	2392
06	2.309401077	0.333333333	32557
07	3.175820197	0.379375555	156128
08	0.663789600	0.065199754	958524

T[385] edges: 16 blocks: 1 orient: +

T[406] edges: 16 blocks: 1 orient: -

16^t_{119} (0) 2^1 2 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	2
04	0.382683432	1.000000000	514
05	0.000000000	0.000000000	1256
06	0.211324865	0.000000000	23029
07	0.000000000	0.000000000	73832
08	1.217268999	-0.494156568	470246

T[386] edges: 16 blocks: 1 orient: +

T[633] edges: 16 blocks: 1 orient: -

16^t_{120} (0) 3^1 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	-0.500000000	4
04	0.500000000	-0.750000000	550
05	0.533393887	-0.938140696	2700
06	0.500000000	0.500000000	36645
07	0.635218233	-0.783431069	182396
08	0.439409469	0.875000000	1108404

T[388] edges: 16 blocks: 1 orient: +

T[702] edges: 16 blocks: 1 orient: -

16^t_{121} (0) 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	582
05	0.311057693	-0.569146580	2528
06	0.288675135	0.000000000	39189
07	0.487448477	-0.652352035	175448
08	0.186343924	1.000000000	1133304

T[389] edges: 16 blocks: 1 orient: +

T[632] edges: 16 blocks: 1 orient: -

16^t_{122} (1) 2^1 2 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	1.847759065	-0.500000000	278
05	0.000000000	0.000000000	1584
06	1.931851652	0.750000000	15281
07	0.000000000	0.000000000	97644
08	2.246947017	-0.137020653	519252

16^t_{123} (0) 3^1 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.500000000	4
04	0.500000000	-0.250000000	268
05	0.861751833	-0.500000000	1564
06	0.500000000	-0.500000000	13729
07	0.263456358	-0.427267472	92068
08	0.296828127	0.625000000	484132

T[391] edges: 16 blocks: 1 orient: +

T[392] edges: 16 blocks: 1 orient: -

16^t_{124} (1) 2^1 2 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	1.000000000	0.625000000	278
05	0.000000000	0.000000000	1600
06	0.000000000	0.000000000	16233
07	0.000000000	0.000000000	99928
08	0.459728757	0.437500000	550300

T[393] edges: 16 blocks: 1 orient: +

T[398] edges: 16 blocks: 1 orient: -

16^t_{125} (0) 4^1 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.250000000	2
04	0.707106781	0.875000000	258
05	1.179974391	-0.906035179	764
06	0.577350269	-0.333333333	8959
07	1.011024697	0.386210835	40630
08	0.977531458	-0.602693271	205072

T[394] edges: 16 blocks: 1 orient: +

T[454] edges: 16 blocks: 1 orient: -

16^t_{126} (0) 8^1 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.250000000	2
04	0.000000000	0.000000000	258
05	1.599543756	0.891291157	782
06	0.577350269	-0.666666667	9209
07	0.727710561	0.648692145	42296
08	0.795547829	0.757402671	217402

T[395] edges: 16 blocks: 1 orient: +

T[408] edges: 16 blocks: 1 orient: -

16^t_{127} (0) 1 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	294
05	1.145742061	0.000000000	1520
06	0.288675135	0.000000000	17041
07	0.911837521	0.000000000	95880
08	0.483572346	0.000000000	538344

T[397] edges: 16 blocks: 1 orient: +

16^t_{128} (0) 2^1 2 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	0.382683432	1.000000000	272
05	0.000000000	0.000000000	1520
06	0.788675135	1.000000000	14245
07	0.000000000	0.000000000	88696
08	0.223713055	-0.425190699	475352

T[401] edges: 16 blocks: 1 orient: +

T[626] edges: 16 blocks: 1 orient: -

16^t_{129} (1) 1 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	8
04	1.000000000	0.000000000	372
05	0.931116293	0.000000000	3368
06	1.000000000	0.000000000	38327
07	1.702576126	0.000000000	269544
08	0.985714650	0.000000000	1714144

T[402] edges: 16 blocks: 1 orient: +

16^t_{130} (1) 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	0.000000000	0.000000000	258
05	0.369458335	-0.558335492	730
06	0.000000000	0.000000000	8605
07	0.706326238	0.956114534	38338
08	0.309974140	0.606162904	193686

T[403] edges: 16 blocks: 1 orient: +

T[469] edges: 16 blocks: 1 orient: -

16^t_{131} (3) 1 blinks

r	mod	theta/pi	#sts
03	2.000000000	0.000000000	8
04	4.000000000	0.000000000	316
05	5.098300563	0.000000000	3272
06	9.000000000	0.000000000	31795
07	12.744472668	0.000000000	245400
08	18.883117546	0.000000000	1498072

T[404] edges: 16 blocks: 1 orient: +

16^t_{132} (1) 1 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	8
04	1.000000000	0.000000000	372
05	1.549150281	0.000000000	3464
06	2.000000000	0.000000000	37495
07	2.009015766	0.000000000	272792
08	1.814141775	0.000000000	1701400

16^t_{133} (1) 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	1.000000000	0.000000000	258
05	1.011100716	0.255201154	788
06	1.000000000	0.000000000	9343
07	1.142664819	-0.004579267	41462
08	0.502166379	0.000000000	210668

T[413] edges: 16 blocks: 1 orient: +

T[656] edges: 16 blocks: 1 orient: -

16^t_{134} (1) 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	8
04	1.000000000	0.000000000	388
05	1.931116293	0.000000000	3552
06	1.000000000	0.000000000	41419
07	0.971487854	-0.075623107	292552
08	0.902453529	0.000000000	1874312

T[414] edges: 16 blocks: 1 orient: +

T[460] edges: 16 blocks: 1 orient: -

16^t_{135} (0) 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	326
05	1.145742061	0.000000000	1676
06	0.288675135	0.000000000	19277
07	0.316028303	-0.150483293	110796
08	0.041692429	1.000000000	616772

T[415] edges: 16 blocks: 1 orient: +

T[514] edges: 16 blocks: 1 orient: -

16^t_{136} (1) 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	1.000000000	0.000000000	258
05	0.638276029	0.288128758	788
06	1.000000000	0.000000000	9343
07	1.636196218	-0.034374734	41462
08	0.477779762	0.000000000	210668

T[416] edges: 16 blocks: 1 orient: +

T[647] edges: 16 blocks: 1 orient: -

16^t_{137} (0) 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	390
05	0.579083211	0.355558209	1920
06	0.288675135	0.000000000	27557
07	0.860731644	-0.007879161	134412
08	0.594291037	0.000000000	844132

T[417] edges: 16 blocks: 1 orient: +

T[623] edges: 16 blocks: 1 orient: -

16^t_{138} (1) 2^1 2 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	0.765366865	1.000000000	294
05	0.000000000	0.000000000	1580
06	0.517638090	-0.916666667	17509
07	0.000000000	0.000000000	99968
08	1.381124664	0.480524408	561828

T[418] edges: 16 blocks: 1 orient: +

T[456] edges: 16 blocks: 1 orient: -

16^t_{139} (1) 2^1 2 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	1.000000000	0.625000000	294
05	0.000000000	0.000000000	1620
06	0.517638090	0.916666667	17757
07	0.000000000	0.000000000	104288
08	1.152173311	0.647825864	583560

T[419] edges: 16 blocks: 1 orient: +

T[438] edges: 16 blocks: 1 orient: -

16^t_{140} (0) 4 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	326
05	0.828810492	0.200682317	1736
06	0.288675135	0.000000000	19469
07	0.369735450	0.097853027	114084
08	0.499366312	1.000000000	624200

T[423] edges: 16 blocks: 1 orient: +

T[445] edges: 16 blocks: 1 orient: -

T[444] edges: 16 blocks: 1 orient: +

T[473] edges: 16 blocks: 1 orient: -

16^t_{141} (0) 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	326
05	0.828231334	0.000000000	1736
06	0.288675135	0.000000000	19469
07	0.591962818	0.000000000	114084
08	0.297863204	0.000000000	624200

T[424] edges: 16 blocks: 1 orient: +

T[468] edges: 16 blocks: 1 orient: +

16^t_{142} (0) 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	326
05	0.314488186	0.000000000	1696
06	0.288675135	0.000000000	21113
07	1.546327427	0.000000000	113232
08	0.931913875	0.000000000	663132

T[426] edges: 16 blocks: 1 orient: +

T[435] edges: 16 blocks: 1 orient: +

16^t_{143} (1) 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	1.000000000	0.000000000	258
05	0.502176658	0.492268724	788
06	1.000000000	0.000000000	9343
07	1.641389916	-0.145293532	41462
08	0.389468007	0.000000000	210668

T[638] edges: 16 blocks: 1 orient: -

16^t_{144} (1) 1 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	1.000000000	0.000000000	258
05	0.150923032	1.000000000	806
06	1.000000000	0.000000000	9455
07	1.252011626	0.000000000	43442
08	1.453393144	0.000000000	220512

T[427] edges: 16 blocks: 1 orient: +

16^t_{145} (0) 3^1 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.500000000	4
04	0.500000000	0.750000000	278
05	0.090780348	0.500000000	1648
06	0.500000000	-0.500000000	15705
07	0.679575957	0.185948077	100324
08	0.090521482	-0.875000000	538060

T[428] edges: 16 blocks: 1 orient: +

T[492] edges: 16 blocks: 1 orient: -

16^t_{146} (1) 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	1.000000000	0.000000000	258
05	0.376941013	0.000000000	752
06	1.000000000	0.000000000	8827
07	0.379778317	0.000000000	39296
08	0.056274848	1.000000000	195216

T[429] edges: 16 blocks: 1 orient: +

T[458] edges: 16 blocks: 1 orient: +

16^t_{147} (1) 1 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	8
04	1.000000000	0.000000000	436
05	1.931116293	0.000000000	3888
06	1.000000000	0.000000000	45151
07	1.054306107	0.000000000	326064
08	1.304473783	0.000000000	2038848

T[431] edges: 16 blocks: 1 orient: +

16^t_{148} (1) 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	1.000000000	0.000000000	258
05	0.584868622	0.125409201	806
06	1.000000000	0.000000000	9455
07	0.669901522	0.152437433	43442
08	0.250142300	1.000000000	220512

T[434] edges: 16 blocks: 1 orient: +

T[451] edges: 16 blocks: 1 orient: -

16^t_{149} (0) 4 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	326
05	0.314488186	0.000000000	1828
06	0.288675135	0.000000000	21553
07	0.745358881	0.081311555	126032
08	1.620357495	0.000000000	735988

T[437] edges: 16 blocks: 1 orient: +

T[464] edges: 16 blocks: 1 orient: +

T[449] edges: 16 blocks: 1 orient: -

T[537] edges: 16 blocks: 1 orient: -

16^t_{150} (0) 2^1 2 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	0.382683432	1.000000000	272
05	0.000000000	0.000000000	1552
06	0.211324865	0.000000000	14513
07	0.000000000	0.000000000	92196
08	0.948066526	0.559596087	496128

T[439] edges: 16 blocks: 1 orient: +

T[466] edges: 16 blocks: 1 orient: -

16^t_{151} (0) 4^1 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	-0.250000000	2
04	0.707106781	-0.875000000	258
05	0.803369104	0.885183365	758
06	0.577350269	0.333333333	8873
07	0.510393508	-0.301768208	40140
08	0.646799483	0.521043542	200318

T[450] edges: 16 blocks: 1 orient: +

T[490] edges: 16 blocks: 1 orient: -

16^t_{152} (0) 2^1 2 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	8
04	0.382683432	1.000000000	564
05	0.000000000	0.000000000	4984
06	0.912870929	-0.602416382	53011
07	0.000000000	0.000000000	379056
08	1.941486277	-0.494121834	2330216

T[453] edges: 16 blocks: 1 orient: +

T[474] edges: 16 blocks: 1 orient: -

T[615] edges: 16 blocks: 1 orient: -

16^t_{153} (1) 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	0.000000000	0.000000000	258
05	0.584629175	0.076276322	754
06	1.000000000	0.000000000	8987
07	1.166333828	-0.067656520	39758
08	0.518051728	0.075242398	203880

T[461] edges: 16 blocks: 1 orient: +

T[653] edges: 16 blocks: 1 orient: -

16^t_{154} (1) 2^1 2 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	1.847759065	-0.500000000	278
05	0.000000000	0.000000000	1712
06	1.414213562	0.916666667	16841
07	0.000000000	0.000000000	109772
08	1.702537743	-0.128344646	606612

16^t_{155} (2) 2 blinks

r	mod	theta/pi	#sts
03	1.414213562	0.000000000	4
04	0.000000000	0.000000000	550
05	0.462725308	0.675632347	2532
06	2.645751311	0.060518859	35121
07	3.224446271	0.045035586	170280
08	0.330599929	0.448952228	1036092

T[462] edges: 16 blocks: 1 orient: +

T[650] edges: 16 blocks: 1 orient: -

16^t_{156} (0) 2^1 2 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	2
04	0.923879533	-0.500000000	514
05	0.000000000	0.000000000	1214
06	0.912870929	-0.602416382	22187
07	0.000000000	0.000000000	71264
08	0.961141591	0.839203319	448196

T[463] edges: 16 blocks: 1 orient: +

T[616] edges: 16 blocks: 1 orient: -

16^t_{157} (1) 1 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	0.000000000	0.000000000	258
05	0.668737080	0.000000000	764
06	1.000000000	0.000000000	8959
07	0.097615949	0.000000000	40630
08	0.262484285	0.000000000	205072

T[467] edges: 16 blocks: 1 orient: +

16^t_{158} (1) 1 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	0.000000000	0.000000000	258
05	0.432669103	0.000000000	786
06	1.000000000	0.000000000	9265
07	0.661773906	0.000000000	42696
08	1.108155353	0.000000000	221170

T[470] edges: 16 blocks: 1 orient: +

16^t_{159} (2) 2 blinks

r	mod	theta/pi	#sts
03	1.414213562	0.000000000	8
04	2.000000000	0.000000000	332
05	2.748384109	0.009128962	3376
06	2.645751311	0.060518859	33647
07	2.330227192	0.209363810	258104
08	0.832957755	0.000000000	1581288

T[476] edges: 16 blocks: 1 orient: +

T[594] edges: 16 blocks: 1 orient: -

16^t_{160} (0) 4^1 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	-0.250000000	2
04	0.707106781	-0.875000000	258
05	0.431163969	0.145266284	820
06	1.154700538	0.000000000	9879
07	1.450488462	-0.257276363	44160
08	0.968531149	-0.752435389	237360

T[478] edges: 16 blocks: 1 orient: +

T[700] edges: 16 blocks: 1 orient: -

16^t_{161} (0) 2^1 2 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	0.382683432	1.000000000	272
05	0.000000000	0.000000000	1580
06	0.912870929	0.602416382	14981
07	0.000000000	0.000000000	95088
08	0.219946253	-0.115639345	520328

T[479] edges: 16 blocks: 1 orient: +

T[654] edges: 16 blocks: 1 orient: -

16^t_{162} (1) 2^1 2 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	1.000000000	-0.625000000	294
05	0.000000000	0.000000000	1672
06	1.000000000	0.500000000	18061
07	0.000000000	0.000000000	109244
08	0.429914705	-0.148791953	608096

T[581] edges: 16 blocks: 1 orient: -

16^t_{163} (1) 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	0.000000000	0.000000000	258
05	0.971605438	-0.172839744	794
06	1.000000000	0.000000000	9203
07	0.526659974	0.236896791	43370
08	0.848407729	0.935181383	219968

T[481] edges: 16 blocks: 1 orient: +

T[557] edges: 16 blocks: 1 orient: -

16^t_{164} (0) 2^1 2 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	2
04	0.923879533	0.500000000	514
05	0.000000000	0.000000000	1256
06	0.912870929	0.602416382	23029
07	0.000000000	0.000000000	73832
08	0.366750104	0.540000231	470246

T[482] edges: 16 blocks: 1 orient: +

T[678] edges: 16 blocks: 1 orient: -

16^t_{165} (1) 1 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	8
04	1.000000000	0.000000000	312
05	0.313082304	0.000000000	3272
06	0.000000000	0.000000000	31355
07	0.594503545	0.000000000	244600
08	0.147186258	0.000000000	1496840

T[483] edges: 16 blocks: 1 orient: +

16^t_{166} (2) 1 blinks

r	mod	theta/pi	#sts
03	1.414213562	0.000000000	16
04	2.000000000	0.000000000	464
05	3.810128726	0.000000000	7216
06	3.464101615	0.000000000	84081
07	6.964618875	0.000000000	748400
08	7.147068582	0.000000000	5276720

T[485] edges: 16 blocks: 1 orient: +

16^t_{167} (1) 2^1 2 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	1.000000000	-0.625000000	294
05	0.000000000	0.000000000	1560
06	1.000000000	-0.500000000	17273
07	0.000000000	0.000000000	99552
08	0.429914705	0.976208047	556716

T[486] edges: 16 blocks: 1 orient: +

T[504] edges: 16 blocks: 1 orient: -

16^t_{168} (0) 4^1 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	-0.250000000	2
04	0.707106781	-0.875000000	258
05	0.248267420	0.443556883	748
06	1.154700538	0.000000000	8863
07	0.818711741	-0.396702804	38852
08	0.674330862	-0.954595628	196408

T[487] edges: 16 blocks: 1 orient: +

T[639] edges: 16 blocks: 1 orient: -

16^t_{169} (1) 2^1 2 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	1.847759065	-0.500000000	278
05	0.000000000	0.000000000	1584
06	1.931851653	0.916666667	15281
07	0.000000000	0.000000000	97644
08	2.580681796	-0.278798298	519252

T[488] edges: 16 blocks: 1 orient: +

T[640] edges: 16 blocks: 1 orient: -

16^t_{170} (1) 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	1.000000000	0.000000000	258
05	0.477160954	1.000000000	724
06	0.000000000	0.000000000	8557
07	0.139762211	1.000000000	37514
08	0.546755533	0.000000000	188510

T[489] edges: 16 blocks: 1 orient: +

T[508] edges: 16 blocks: 1 orient: +

16^t_{171} (0) 2^1 2 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	0.382683432	1.000000000	272
05	0.000000000	0.000000000	1600
06	0.788675135	1.000000000	15441
07	0.000000000	0.000000000	95196
08	0.436817768	-0.248769717	528648

T[491] edges: 16 blocks: 1 orient: +

T[641] edges: 16 blocks: 1 orient: -

16^t_{172} (0) 2^1 2 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	2
04	0.923879533	0.500000000	514
05	0.000000000	0.000000000	1316
06	0.788675135	1.000000000	24073
07	0.000000000	0.000000000	78428
08	0.697476770	0.157644456	509114

T[498] edges: 16 blocks: 1 orient: +

T[705] edges: 16 blocks: 1 orient: -

16^t_{173} (0) 4^1 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.250000000	2
04	0.707106781	0.375000000	258
05	0.662252010	-0.718703773	800
06	0.577350269	-0.333333333	9475
07	1.123209959	-0.009652746	42844
08	0.364943633	0.601878149	220552

T[497] edges: 16 blocks: 1 orient: +

T[645] edges: 16 blocks: 1 orient: -

16^t_{174} (1) 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	8
04	1.000000000	0.000000000	388
05	1.706302846	0.068290739	3528
06	1.000000000	0.000000000	39891
07	0.552848553	-0.058217234	283832
08	0.327993849	1.000000000	1789720

T[499] edges: 16 blocks: 1 orient: +

T[507] edges: 16 blocks: 1 orient: -

16^t_{175} (1) 1 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	0.000000000	0.000000000	258
05	0.005024999	1.000000000	770
06	0.000000000	0.000000000	9029
07	0.180176552	1.000000000	41120
08	1.489973071	0.000000000	208710

T[505] edges: 16 blocks: 1 orient: +

16^t_{176} (0) 2^1 2 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	2
04	0.923879533	0.500000000	514
05	0.000000000	0.000000000	1244
06	0.211324865	0.000000000	22849
07	0.000000000	0.000000000	73136
08	0.186819872	-0.252455287	465218

T[506] edges: 16 blocks: 1 orient: +

T[619] edges: 16 blocks: 1 orient: -

16^t_{177} (1) 1 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	1.000000000	0.000000000	258
05	0.005024999	1.000000000	766
06	1.000000000	0.000000000	9069
07	1.505173648	0.000000000	40330
08	0.571142150	0.000000000	204954

T[515] edges: 16 blocks: 1 orient: +

16^t_{178} (0) 2^1 2 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	0.382683432	1.000000000	272
05	0.000000000	0.000000000	1604
06	0.788675135	1.000000000	14789
07	0.000000000	0.000000000	97180
08	0.238728602	0.525241290	517840

T[524] edges: 16 blocks: 1 orient: +

T[566] edges: 16 blocks: 1 orient: -

16^t_{179} (0) 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	8
04	0.500000000	0.000000000	388
05	0.612441223	-0.335704144	3672
06	0.288675135	0.000000000	38859
07	0.134555071	-0.112054174	291864
08	0.420178658	1.000000000	1782856

T[525] edges: 16 blocks: 1 orient: +

T[569] edges: 16 blocks: 1 orient: -

16^t_{180} (1) 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	1.000000000	0.000000000	258
05	0.473712872	0.603211327	782
06	1.000000000	0.333333333	9071
07	1.739509707	0.297333112	42014
08	0.335644138	0.000000000	210136

T[526] edges: 16 blocks: 1 orient: +

T[589] edges: 16 blocks: 1 orient: -

16^t_{181} (0) 4^1 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.250000000	2
04	0.707106781	0.375000000	258
05	0.561633512	-0.663492147	800
06	0.577350269	-0.333333333	9475
07	1.376653831	-0.000034175	42844
08	0.600752576	-0.612730690	220552

T[527] edges: 16 blocks: 1 orient: +

T[668] edges: 16 blocks: 1 orient: -

16^{t}_{182} (0) 2 blinks

T[523] edges: 16 blocks: 1 orient: +

T[707] edges: 16 blocks: 1 orient: -

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	526
05	0.411403453	0.032770866	2556
06	0.288675135	0.000000000	31201
07	1.219571694	0.525321757	165684
08	0.113286266	1.000000000	956008

16^{t}_{183} (0) 2^{1} 2 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	2
04	0.923879533	0.500000000	514
05	0.000000000	0.000000000	1274
06	0.211324865	0.000000000	23303
07	0.000000000	0.000000000	75956
08	0.176976960	-0.224564581	491264

T[530] edges: 16 blocks: 1 orient: +

T[676] edges: 16 blocks: 1 orient: -

16^{t}_{184} (0) 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	326
05	0.974323378	-0.100305142	1728
06	0.288675135	0.000000000	19549
07	0.241631035	-0.042710572	115728
08	0.553759261	1.000000000	644960

T[531] edges: 16 blocks: 1 orient: +

T[568] edges: 16 blocks: 1 orient: -

16^{t}_{185} (0) 4^{1} 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.250000000	2
04	0.707106781	0.375000000	258
05	0.917970627	0.451482212	858
06	0.577350269	1.000000000	10609
07	0.687015449	-0.314468119	47696
08	0.372764780	-0.024114904	268906

T[532] edges: 16 blocks: 1 orient: +

T[673] edges: 16 blocks: 1 orient: -

16^{t}_{186} (1) 1 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	1.000000000	0.000000000	258
05	0.623058987	1.000000000	772
06	0.000000000	0.000000000	9115
07	1.383785390	0.000000000	41180
08	0.571142150	0.000000000	210064

T[533] edges: 16 blocks: 1 orient: +

16^{t}_{187} (0) 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	278
05	0.316589761	-0.402890266	1648
06	0.288675135	0.000000000	16497
07	1.178124905	0.035768972	104568
08	1.108290663	0.000000000	573124

T[534] edges: 16 blocks: 1 orient: +

T[597] edges: 16 blocks: 1 orient: -

16^{t}_{188} (0) 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	268
05	0.575046898	-0.493748823	1672
06	0.288675135	0.000000000	14957
07	0.519506465	-0.923693567	100056
08	0.655614571	1.000000000	537648

T[535] edges: 16 blocks: 1 orient: +

T[667] edges: 16 blocks: 1 orient: -

16^{t}_{189} (0) 4^{1} 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.250000000	2
04	0.707106781	0.375000000	258
05	0.243442455	-0.847969631	830
06	0.577350269	-0.333333333	9929
07	0.968360012	-0.263149643	45544
08	1.262980703	0.536710384	243514

T[536] edges: 16 blocks: 1 orient: +

T[652] edges: 16 blocks: 1 orient: -

16^{t}_{190} (1) 1 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	1.000000000	0.000000000	258
05	0.532889044	1.000000000	788
06	1.000000000	0.000000000	9379
07	1.759530938	0.000000000	42478
08	2.252383017	0.000000000	223316

T[538] edges: 16 blocks: 1 orient: +

16^{t}_{191} (1) 1 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	1.000000000	0.000000000	258
05	0.557280900	0.000000000	766
06	1.000000000	0.000000000	9069
07	2.015562763	0.000000000	40330
08	2.301156253	0.000000000	204954

T[539] edges: 16 blocks: 1 orient: +

16^t_{192} (0) 4^1 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.250000000	2
04	0.707106781	0.375000000	258
05	0.418472500	-0.891324252	788
06	0.577350269	-0.333333333	9343
07	1.586988139	-0.018168495	41462
08	0.139074580	-0.946505839	210668

T[674] edges: 16 blocks: 1 orient: -

16^t_{193} (0) 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	8
04	0.500000000	0.000000000	332
05	0.133703646	0.629030240	3472
06	0.288675135	0.000000000	34607
07	0.415539534	0.165281960	265784
08	0.268264961	0.000000000	1629280

T[541] edges: 16 blocks: 1 orient: +

T[604] edges: 16 blocks: 1 orient: -

16^t_{194} (0) 2^1 2 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	0.382683432	1.000000000	270
05	0.000000000	0.000000000	1584
06	0.912870929	-0.602416382	14053
07	0.000000000	0.000000000	93824
08	0.280281529	-0.895804502	490448

T[545] edges: 16 blocks: 1 orient: +

T[606] edges: 16 blocks: 1 orient: -

16^t_{195} (1) 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	0.000000000	0.000000000	258
05	0.744750720	-0.764536255	802
06	0.000000000	0.000000000	9355
07	0.237879191	0.381690698	43904
08	0.913304502	0.060154945	224836

T[546] edges: 16 blocks: 1 orient: +

T[556] edges: 16 blocks: 1 orient: -

16^t_{196} (0) 4^1 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.250000000	2
04	0.707106781	0.375000000	258
05	0.997927164	-0.925509765	806
06	0.577350269	-0.333333333	9455
07	0.877688052	-0.223435790	43442
08	0.325894526	-0.536184428	220512

T[547] edges: 16 blocks: 1 orient: +

T[587] edges: 16 blocks: 1 orient: -

16^t_{197} (1) 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	1.000000000	0.000000000	258
05	1.001564212	0.601518851	776
06	1.000000000	0.333333333	9025
07	1.161601388	0.326716864	41168
08	0.914287901	0.000000000	205034

T[548] edges: 16 blocks: 1 orient: +

T[590] edges: 16 blocks: 1 orient: -

16^t_{198} (1) 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	0.000000000	0.000000000	258
05	0.584629175	0.076276322	806
06	1.000000000	0.000000000	9455
07	1.195594701	-0.265939720	43442
08	0.482421163	0.919082003	220512

T[549] edges: 16 blocks: 1 orient: +

T[558] edges: 16 blocks: 1 orient: -

16^t_{199} (0) 4^1 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.250000000	2
04	0.707106781	0.875000000	258
05	0.436188419	-0.828516650	788
06	0.577350269	-0.333333333	9157
07	0.500337949	0.205351930	42524
08	0.378449149	-0.283149103	214934

T[550] edges: 16 blocks: 1 orient: +

T[560] edges: 16 blocks: 1 orient: -

16^t_{200} (1) 1 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	0.000000000	0.000000000	258
05	0.814635114	0.000000000	798
06	1.000000000	0.000000000	9255
07	0.278856274	0.000000000	43684
08	0.519261645	1.000000000	222448

T[551] edges: 16 blocks: 1 orient: +

16^t_{201} (1) 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	0.000000000	0.000000000	258
05	0.604292940	0.574572400	782
06	1.000000000	0.333333333	9071
07	0.544453302	0.260580426	42014
08	1.011445388	0.547931339	210136

T[552] edges: 16 blocks: 1 orient: +

T[562] edges: 16 blocks: 1 orient: -

16^t_{202} (1) 1 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	8
04	1.000000000	0.000000000	316
05	0.931116293	0.000000000	3368
06	1.000000000	0.000000000	33747
07	0.101778430	0.000000000	258120
08	0.975613382	0.000000000	1600864

16^t_{203} (1) 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	0.000000000	0.000000000	258
05	0.467110956	0.000000000	844
06	1.000000000	0.000000000	10005
07	0.657824834	0.000000000	47008
08	0.632108694	0.000000000	249634

T[554] edges: 16 blocks: 1 orient: +

T[598] edges: 16 blocks: 1 orient: +

16^t_{204} (0) 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	270
05	0.772116421	-0.034475362	1596
06	0.288675135	0.000000000	14273
07	0.726202954	0.177220485	95160
08	0.949777995	0.000000000	499244

T[555] edges: 16 blocks: 1 orient: +

T[578] edges: 16 blocks: 1 orient: -

16^t_{205} (0) 4^1 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	-0.250000000	2
04	0.707106781	-0.875000000	258
05	0.768856360	0.379820483	796
06	1.154700538	0.000000000	9309
07	0.723356203	-0.373437575	43052
08	1.057301384	0.719904001	219726

T[559] edges: 16 blocks: 1 orient: +

T[579] edges: 16 blocks: 1 orient: -

16^t_{206} (1) 1 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	0.000000000	0.000000000	258
05	0.532889044	1.000000000	842
06	0.000000000	0.000000000	9995
07	1.138332717	0.000000000	46700
08	2.046322257	0.000000000	248268

T[561] edges: 16 blocks: 1 orient: +

16^t_{207} (0) 1 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	270
05	0.314488186	0.000000000	1596
06	0.288675135	0.000000000	14273
07	0.066036481	0.000000000	95160
08	2.385724359	0.000000000	499244

T[563] edges: 16 blocks: 1 orient: +

16^t_{208} (1) 1 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	0.000000000	0.000000000	258
05	1.467110956	0.000000000	786
06	2.000000000	0.000000000	9265
07	1.608358272	0.000000000	42696
08	0.610531993	1.000000000	221170

T[564] edges: 16 blocks: 1 orient: +

16^t_{209} (1) 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	0.000000000	0.000000000	258
05	0.232021469	-0.204052176	812
06	1.000000000	0.000000000	9469
07	1.071968189	0.178245971	44908
08	0.587379110	-0.066222052	232234

T[565] edges: 16 blocks: 1 orient: +

T[580] edges: 16 blocks: 1 orient: -

16^t_{210} (0) 2^1 2 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	0.382683432	1.000000000	278
05	0.000000000	0.000000000	1612
06	0.211324865	0.000000000	15901
07	0.000000000	0.000000000	99488
08	0.664710689	-0.504361227	541164

T[567] edges: 16 blocks: 1 orient: +

T[593] edges: 16 blocks: 1 orient: -

16^t_{211} (0) 4^1 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	-0.250000000	2
04	0.707106781	-0.875000000	258
05	0.998661554	0.773528081	796
06	0.577350269	0.333333333	9309
07	0.072104553	0.024897959	43052
08	0.611913210	0.499917084	219726

T[570] edges: 16 blocks: 1 orient: +

T[583] edges: 16 blocks: 1 orient: -

16^t_{212} (0) 4^1 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.250000000	2
04	0.707106781	-0.375000000	258
05	0.375300480	0.246551954	796
06	0.577350269	0.333333333	9309
07	1.304019215	0.194543997	43052
08	0.973551736	-0.328589593	219726

T[591] edges: 16 blocks: 1 orient: -

16^t_{213} (0) 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	270
05	0.828810492	-0.200682317	1596
06	0.288675135	0.000000000	14273
07	0.879450049	-0.003383512	95160
08	0.499366312	1.000000000	499244

T[573] edges: 16 blocks: 1 orient: +

T[582] edges: 16 blocks: 1 orient: -

16^t_{214} (0) 4^1 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.250000000	2
04	0.707106781	0.375000000	258
05	0.580664741	0.214289059	776
06	0.577350269	0.333333333	9025
07	0.209714042	0.555846961	41168
08	0.284426929	-0.532337004	205034

T[574] edges: 16 blocks: 1 orient: +

T[595] edges: 16 blocks: 1 orient: -

16^t_{215} (1) 1 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	0.000000000	0.000000000	258
05	1.175314889	0.000000000	764
06	1.000000000	0.000000000	8959
07	0.255077445	0.000000000	40630
08	0.436867076	1.000000000	205072

T[575] edges: 16 blocks: 1 orient: +

16^t_{216} (0) 4^1 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.250000000	2
04	0.707106781	0.375000000	258
05	0.855640170	-0.713550882	788
06	0.577350269	-0.333333333	9343
07	1.028696710	-0.191662952	41462
08	0.832370526	-0.532948820	210668

T[577] edges: 16 blocks: 1 orient: +

T[628] edges: 16 blocks: 1 orient: -

16^t_{217} (0) 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	278
05	0.293065211	0.034694683	1696
06	0.288675135	0.000000000	17097
07	1.335663128	-0.198627661	106964
08	0.716274876	0.000000000	591540

T[585] edges: 16 blocks: 1 orient: +

T[636] edges: 16 blocks: 1 orient: -

16^t_{218} (0) 2^1 2 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	0.382683432	1.000000000	270
05	0.000000000	0.000000000	1704
06	0.788675135	1.000000000	16445
07	0.000000000	0.000000000	106020
08	0.418943492	-0.357016649	588128

T[586] edges: 16 blocks: 1 orient: +

T[592] edges: 16 blocks: 1 orient: -

16^t_{219} (1) 1 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	1.000000000	0.000000000	258
05	0.175314889	0.000000000	788
06	1.000000000	0.000000000	9379
07	0.414704699	0.000000000	42478
08	0.757000375	0.000000000	223316

T[588] edges: 16 blocks: 1 orient: +

16^t_{220} (1) 1 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	8
04	1.000000000	0.000000000	312
05	0.403252248	0.000000000	3544
06	1.000000000	0.000000000	34079
07	1.404699852	0.000000000	273088
08	3.897402896	0.000000000	1677784

T[596] edges: 16 blocks: 1 orient: +

16^t_{221} (0) 4^1 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	-0.250000000	2
04	0.707106781	-0.375000000	258
05	0.733601725	-0.922256585	788
06	0.577350269	0.333333333	9157
07	0.741581851	-0.030376675	42524
08	1.026145221	-0.504921996	214934

T[599] edges: 16 blocks: 1 orient: +

T[605] edges: 16 blocks: 1 orient: -

16^{t}_{222} (0) 1 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	278
05	1.220696176	0.000000000	1648
06	0.288675135	0.000000000	16609
07	0.230182124	0.000000000	102816
08	0.247335843	0.000000000	566388

16^{t}_{223} (0) 1 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	278
05	0.706953028	0.000000000	1628
06	0.288675135	0.000000000	16413
07	1.519522895	0.000000000	101824
08	1.470376592	0.000000000	561620

T[603] edges: 16 blocks: 1 orient: +

16^{t}_{224} (1) 1 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	1.000000000	0.000000000	258
05	0.321212923	0.000000000	776
06	1.000000000	0.000000000	9025
07	0.697406702	0.000000000	41168
08	0.041989498	1.000000000	205034

T[607] edges: 16 blocks: 1 orient: +

16^{t}_{225} (1) 2^{1} 2 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	1.847759065	-0.500000000	278
05	0.000000000	0.000000000	1648
06	1.931851653	-0.916666667	15705
07	0.000000000	0.000000000	100324
08	1.094069091	-0.076516405	538060

T[613] edges: 16 blocks: 1 orient: +

T[684] edges: 16 blocks: 1 orient: -

16^{t}_{226} (2) 2 blinks

r	mod	theta/pi	#sts
03	1.414213562	0.000000000	8
04	2.000000000	0.000000000	324
05	3.383193431	0.007415693	3320
06	1.732050808	0.000000000	32159
07	3.384764794	-0.146530015	247464
08	4.265843498	0.000000000	1507480

T[614] edges: 16 blocks: 1 orient: +

T[687] edges: 16 blocks: 1 orient: -

16^{t}_{227} (0) 2^{1} 2 blinks

r	mod	theta/pi	#sts
03	0.000000000	0.000000000	4
04	0.382683432	1.000000000	278
05	0.000000000	0.000000000	1612
06	0.788675135	1.000000000	15901
07	0.000000000	0.000000000	99488
08	0.460078269	-0.377949177	541164

T[617] edges: 16 blocks: 1 orient: +

T[686] edges: 16 blocks: 1 orient: -

16^{t}_{228} (0) 4^{1} 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	-0.250000000	2
04	0.707106781	-0.875000000	258
05	0.836419527	0.304238294	796
06	1.154700538	0.000000000	9309
07	0.599234670	-0.380696044	43052
08	0.576925399	0.968664536	219726

T[618] edges: 16 blocks: 1 orient: +

T[685] edges: 16 blocks: 1 orient: -

16^{t}_{229} (0) 3^{1} 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	-0.500000000	4
04	0.500000000	-0.750000000	294
05	0.619195221	0.500000000	1404
06	0.500000000	0.500000000	14731
07	0.781997843	-0.227299372	68584
08	0.407546818	0.875000000	357372

T[622] edges: 16 blocks: 1 orient: +

T[635] edges: 16 blocks: 1 orient: -

16^{t}_{230} (1) 1 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	1.000000000	0.000000000	258
05	1.411382866	0.000000000	668
06	2.000000000	0.000000000	8287
07	2.208432275	0.000000000	27596
08	1.070708874	0.000000000	139918

T[624] edges: 16 blocks: 1 orient: +

16^{t}_{231} (1) 2 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	0.000000000	0.000000000	258
05	1.228262757	-0.036036510	676
06	2.000000000	0.000000000	8367
07	1.714302807	0.135162734	28368
08	0.992040596	-0.960975007	144922

T[625] edges: 16 blocks: 1 orient: +

T[681] edges: 16 blocks: 1 orient: -

16^t_{232} (1) 1 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	1.000000000	0.000000000	258
05	1.501552810	0.000000000	668
06	2.000000000	0.000000000	8287
07	2.137108213	0.000000000	27596
08	1.688024605	0.000000000	139918

16^t_{233} (0) 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	326
05	0.706953028	0.000000000	1420
06	0.288675135	0.000000000	17019
07	0.472161455	0.000000000	72552
08	0.573693534	0.000000000	401400

T[631] edges: 16 blocks: 1 orient: +

T[663] edges: 16 blocks: 1 orient: +

16^t_{234} (0) 1 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	270
05	1.220696176	0.000000000	1356
06	0.288675135	0.000000000	12195
07	1.348026810	0.000000000	62312
08	0.431775422	1.000000000	303900

T[644] edges: 16 blocks: 1 orient: +

16^t_{235} (2) 1 blinks

r	mod	theta/pi	#sts
03	1.414213562	0.000000000	16
04	2.000000000	0.000000000	456
05	3.175107272	0.000000000	6288
06	3.464101615	0.000000000	63611
07	4.155214795	0.000000000	493632
08	5.507548956	0.000000000	3069664

T[646] edges: 16 blocks: 1 orient: +

16^t_{236} (0) 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	270
05	0.706953028	0.000000000	1400
06	0.288675135	0.000000000	12743
07	0.496315783	0.261384211	66636
08	0.573693534	0.000000000	330684

T[648] edges: 16 blocks: 1 orient: +

T[670] edges: 16 blocks: 1 orient: -

16^t_{237} (0) 2 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	270
05	0.573497666	0.176511736	1392
06	0.288675135	0.000000000	12711
07	1.136703854	-0.120668998	65704
08	0.433044985	0.000000000	326788

T[665] edges: 16 blocks: 1 orient: +

T[701] edges: 16 blocks: 1 orient: -

16^t_{238} (0) 1 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	270
05	0.389442301	0.000000000	1400
06	0.288675135	0.000000000	12743
07	1.166146568	0.000000000	66636
08	0.913249166	0.000000000	330684

T[669] edges: 16 blocks: 1 orient: +

16^t_{239} (0) 1 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	270
05	0.903185449	0.000000000	1356
06	0.288675135	0.000000000	12195
07	1.747119563	0.000000000	62312
08	0.509968231	0.000000000	303900

T[675] edges: 16 blocks: 1 orient: +

16^t_{240} (1) 1 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	0.000000000	0.000000000	258
05	0.119586799	0.000000000	690
06	1.000000000	0.000000000	8589
07	1.128593258	0.000000000	29288
08	0.759092416	0.000000000	153308

T[683] edges: 16 blocks: 1 orient: +

16^t_{241} (0) 1 blinks

r	mod	theta/pi	#sts
03	0.707106781	0.000000000	4
04	0.500000000	0.000000000	270
05	1.099417870	0.000000000	1188
06	0.288675135	0.000000000	10965
07	0.591774747	0.000000000	44608
08	0.047159195	1.000000000	213172

T[699] edges: 16 blocks: 1 orient: +

16^{t}_{242} (1) 1 blinks

r	mod	theta/pi	#sts
03	1.000000000	0.000000000	2
04	0.000000000	0.000000000	258
05	0.772062641	0.000000000	516
06	2.000000000	0.000000000	7079
07	3.001363833	0.000000000	14152
08	0.410388418	1.000000000	80202