pst-art-geometric

Postscript Geometric Art: Construction of Four-Fold Patterns

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1 Introduction

Geometric art is an artistic style characterized by the deliberate use of precise, non-representational basic shapes like circles, squares, stars, and multi-sided polygons, often arranged in symmetrical patterns or tessellations. The circle and the square are the most basic shapes created by intersection of lines, circular arcs and full circles. The star shape is derived from squares or triangles inscribed in a circle. Types of stars are categorized by their point count, with common examples including 6-pointed stars, often derived from hexagons, and 8-pointed stars, derived from octagons or squares. Other types include 5-pointed, 7-pointed, 9-pointed, 10-pointed, 11-pointed, and even 13- and 16-point stars, which became widespread in different regions and eras, particularly in Persia and Central Asia. They are also formed from a series of lines that interlace and repeat, creating complex tessellations that can appear to extend infinitely.

1.1 Key Characteristics

Geometric art represents mathematical precision and aesthetic harmony, based on repeating geometric units easily drawn with compass and ruler. It provides a rich source of inspiration for art and architecture that is characterized by

- Geometric Forms: The core of geometric art is the use of mathematically defined shapes such as lines, angles, squares, triangles, and circles.

- Abstract and Non-Representational: The art does not aim to imitate nature but strips away reality to focus on pure visual elements, creating non-objective compositions.

- Emphasis on Pattern and Symmetry: Shapes are frequently repeated to create patterns, and their arrangement often features symmetry, contributing to a sense of order and balance.

- Focus on Space and Form: The artwork explores the relationship between shapes and the space they occupy, highlighting the two-dimensionality of the canvas and using negative space effectively.

1.2 Influence and Significance

Geometric shapes, though precise, can be used to express emotions. Geometric art has left a significant impact not just on fine art but also in fields like architecture and design, influencing contemporary creative works. Its focus on precision, pattern, and balance makes geometric art an excellent entry point for beginners to develop artistic and spatial skills.

1.3 Historical Context

Geometric art has ancient origins. Geometric motifs have appeared in art since antiquity, seen in ancient Hindu and Buddhist cultural art, appearing in Greek paintings and as decorative patterns in the Indian, European, and Islamic architectures. It focuses on form, color, and spatial relationships rather than literal depiction, aiming to evoke visual emotion, balance, and a sense of universal truth with their infinite tessellations representing divinity. Originating in ancient times as decorative motifs, geometric abstraction is a universal language for expressing fundamental ideas of geometry. It includes fields such as architecture, ceramics, textiles, painting, and manuscripts, and its common stylistic features create a coherent aesthetic across vast geographical and cultural differences, though regional styles and historical influences are also present. Intricate and complex geometric designs as aniconism, non-figurative art, are a hallmark of Islamic art, often combined with Arabesque—stylized plant forms, such as vines, leaves, and spiraling flowers, as a common and distinctive decorative element. Celtic art is a style of art, prevalent across Europe from the Bronze Age to the Medieval period, characterized by intricate, abstract, and geometric designs, particularly interlacing patterns, spirals, and triskeles, which are geometric designs often found in nature but used in an abstract manner. It avoids straight lines, often displays complex symbolism, and features a harmonious balance between filled areas and negative space. This art was used for decorative purposes on various objects, reflecting Celtic beliefs and status, and evolved significantly. In early 20th century geometric art flourished in artistic movements like Cubism, Futurism, and Suprematism. It is a search for the Universal Language that transcend cultural barriers and express fundamental concepts.
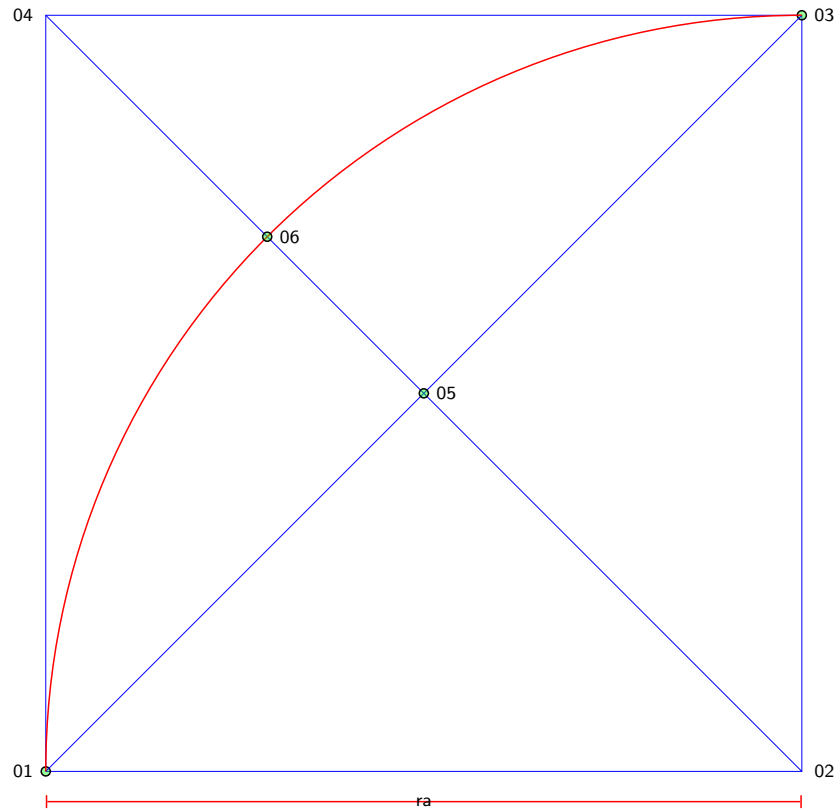
1.4 Construction Steps
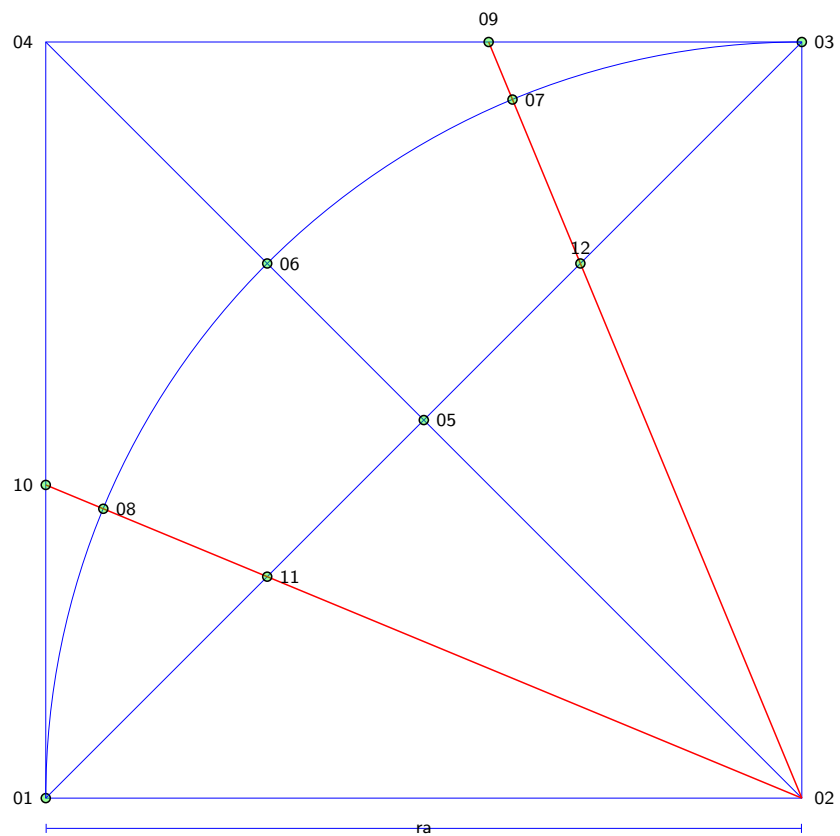
1.4.1 Step 1 - draw a rectangle of side ra

04 ●————————————————————————● 03

01 ●————————————————————————● 02
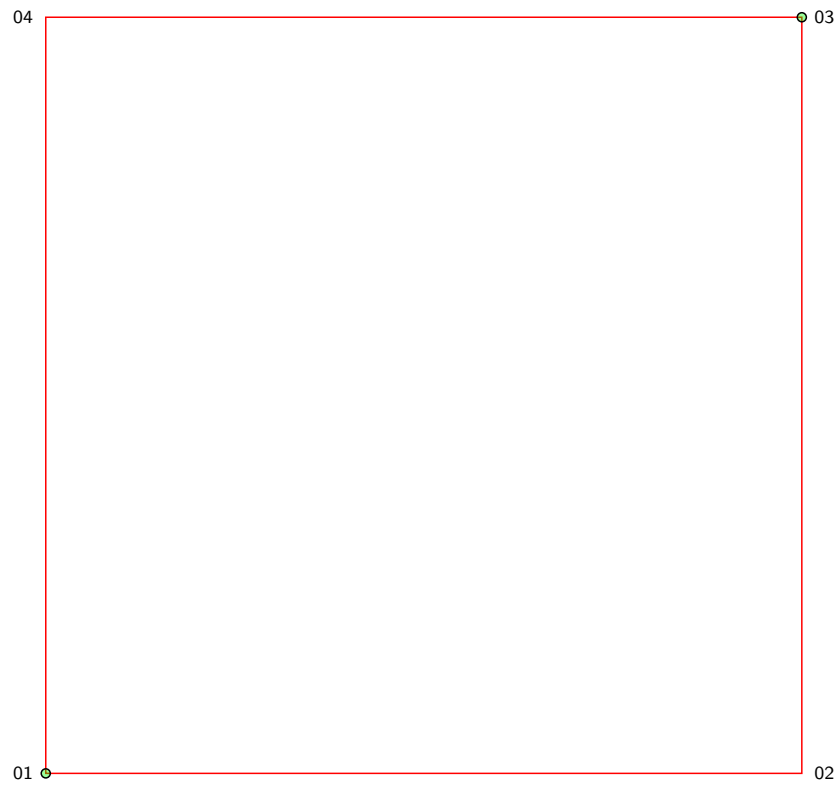
1.4.2 Step 2 - draw diagonal lines 01-03 and 02-04 = 05

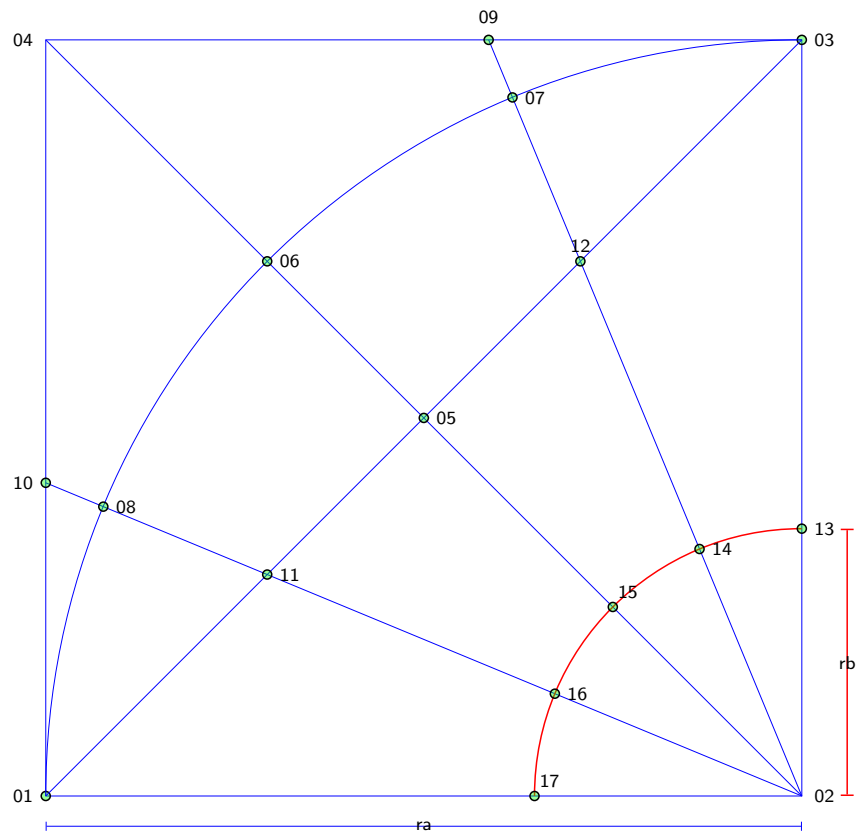04 ●————————————————————————● 03

● 05

01 ●————————————————————————● 02
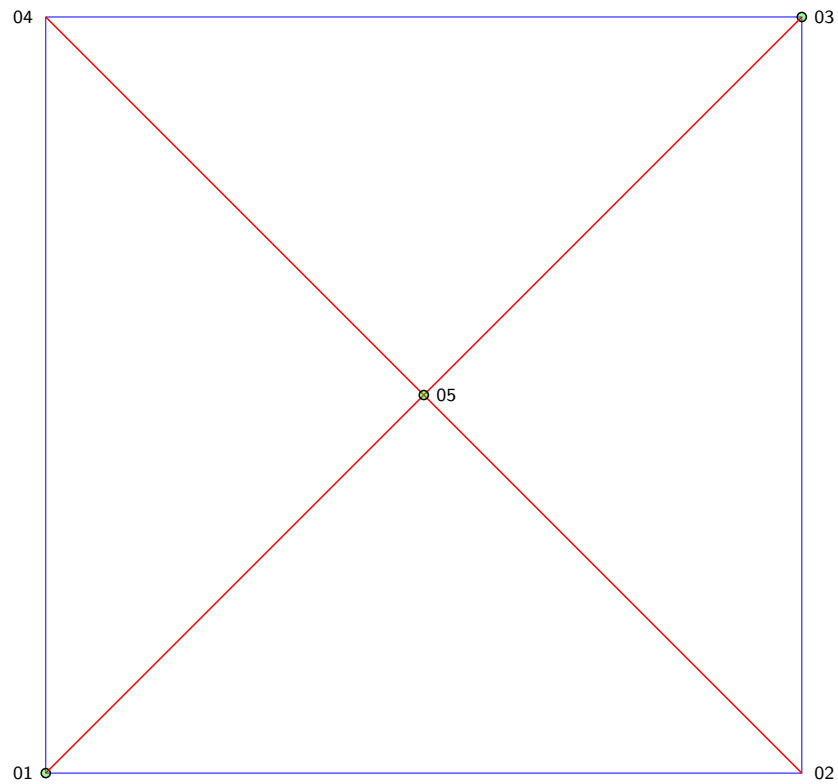
1.4.3   Step 3 - draw arch at 04 with radius ra = 06

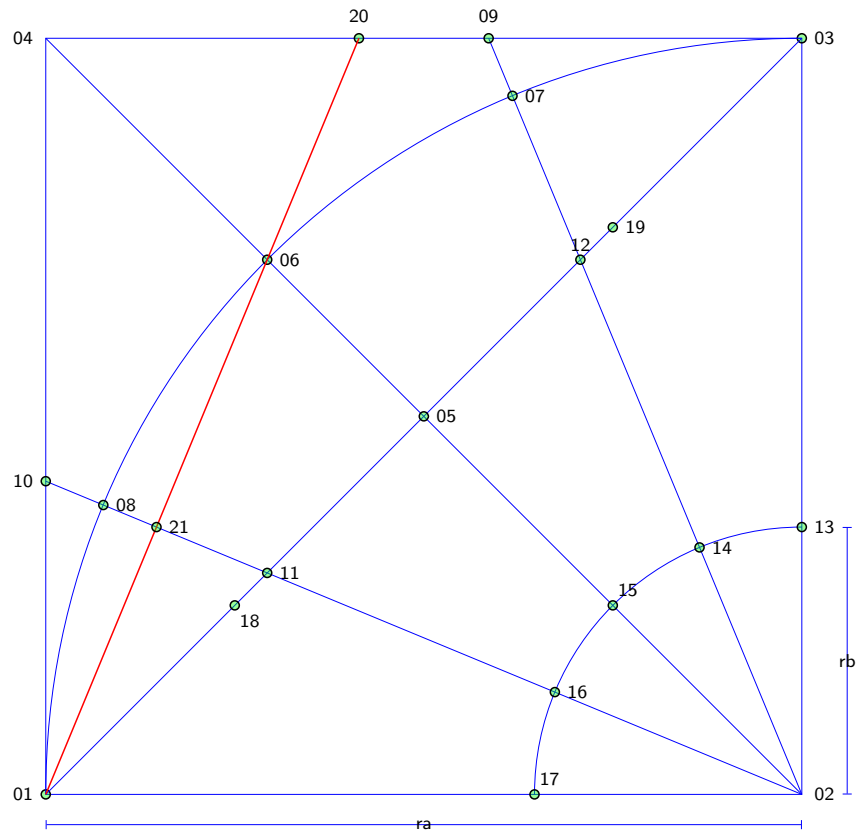### 1.4.4   Step 4 - divide 02 in 4 equal parts of 22.5 deg = 12
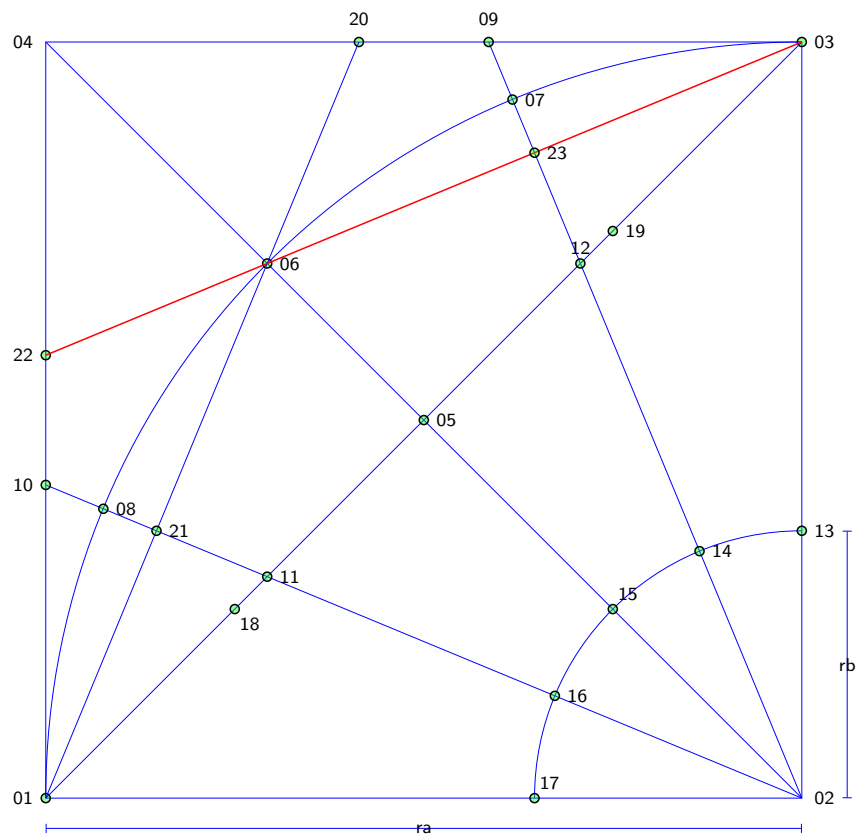
1.4.5   Step 5 - draw atc at 04 with radius rb=02-05/2 = 17

1.4.6   Step 6 - mark points 18, 19 on line 01-03 with radius rb = 19
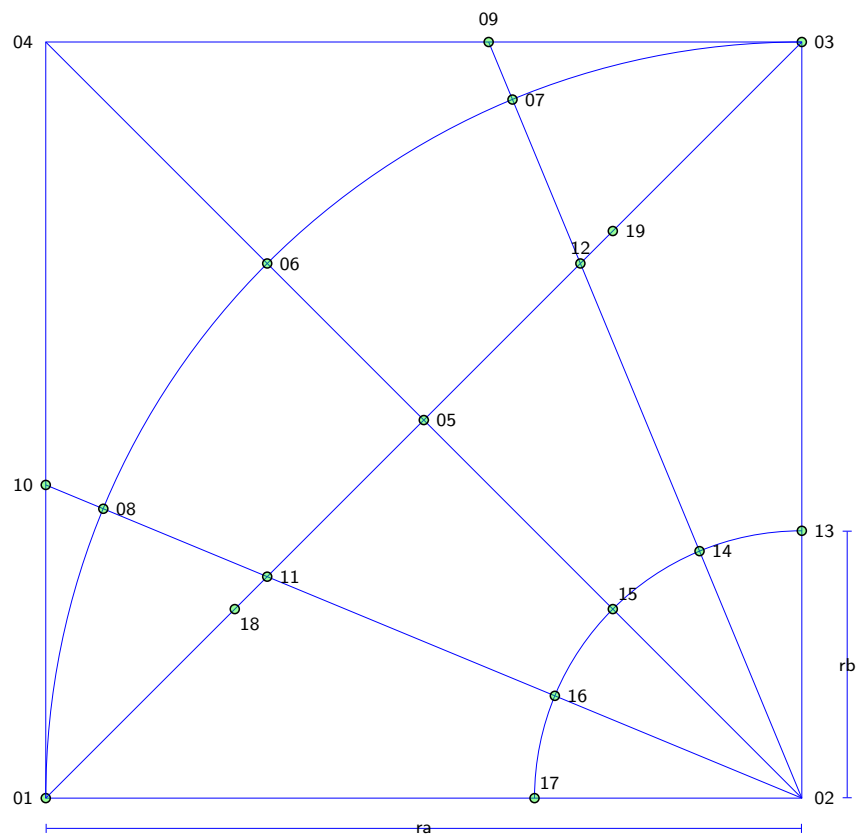
1.4.7 Step 7 - draw line 01-06 extend it to intersect 03-04 = 21

1.4.8 Step 8 - draw line 03-06 extend it to intersect 01-04 = 23
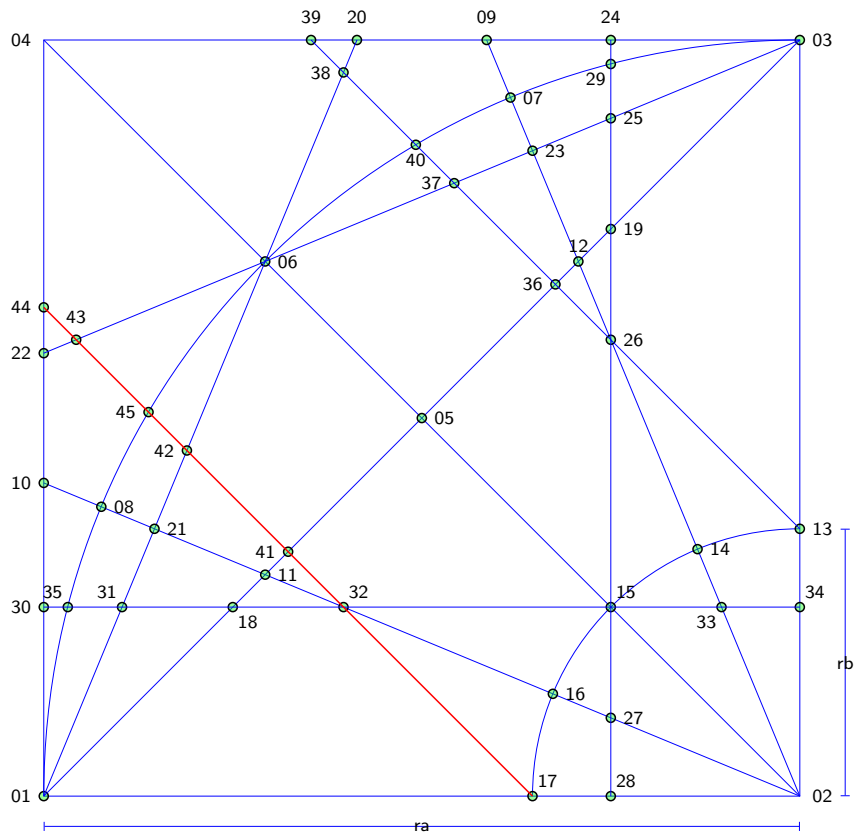
1.4.9   Step 9 - draw vertical line 15-19 extend it = 29
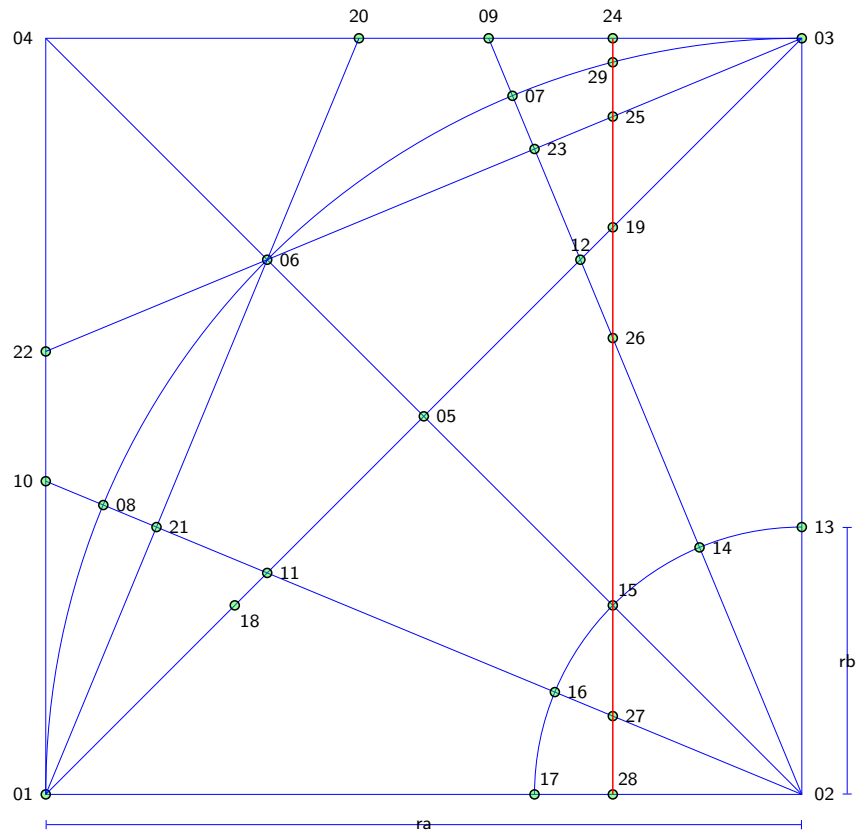
1.4.10   Step 10 - draw line 15-18 extend it to intersect line 01-04 = 35
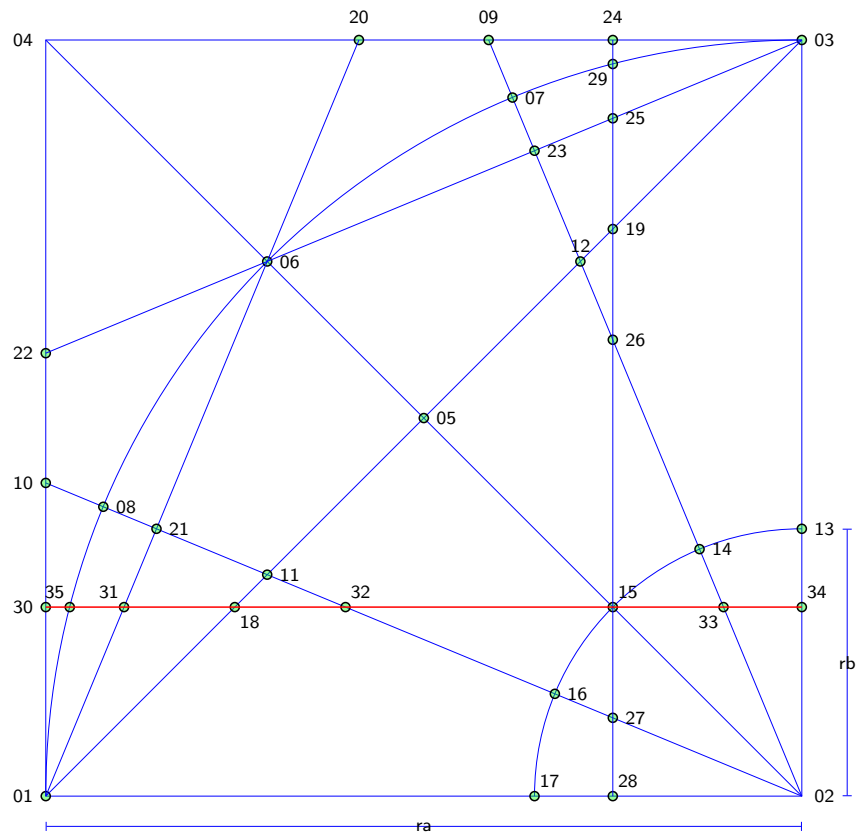
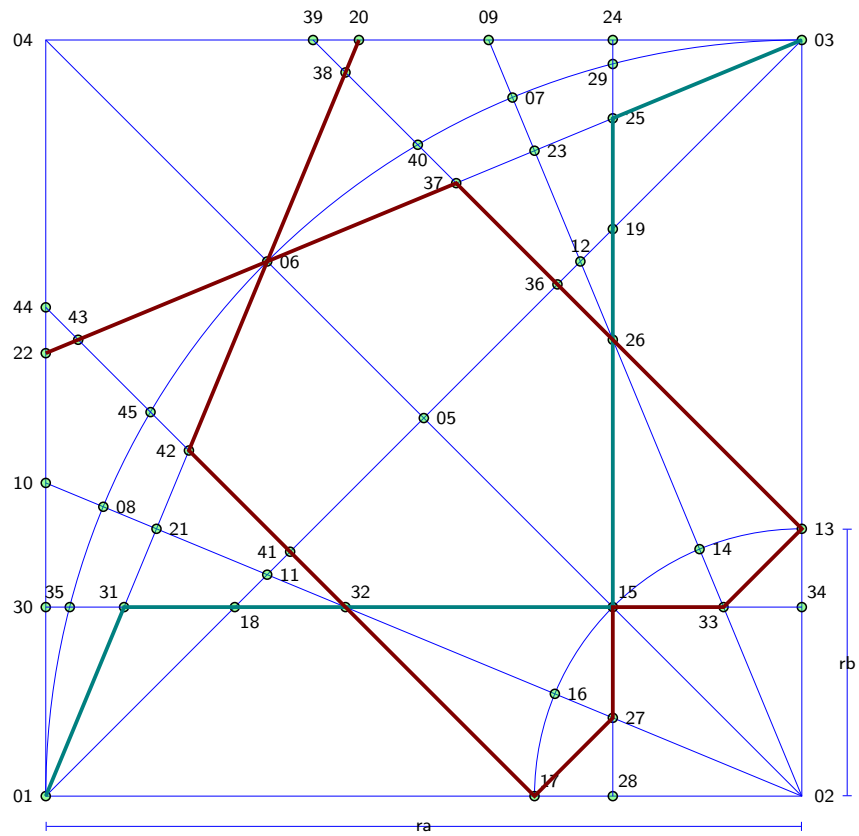## 1.4.11 Step 11 - draw line 13-26 and extend it = 40
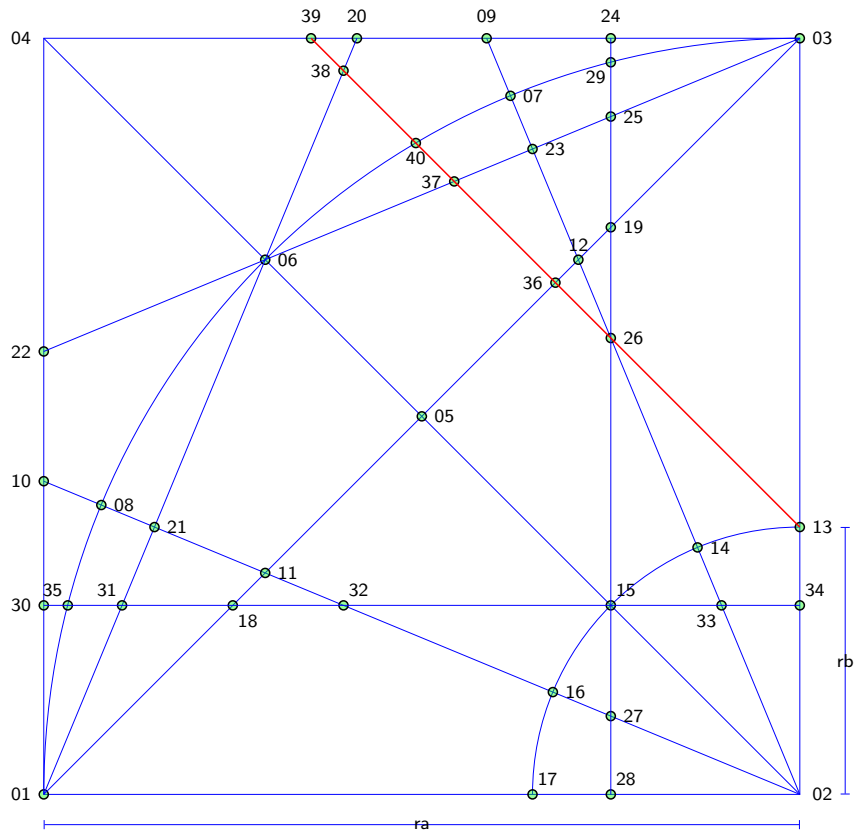
1.4.12 Step 12 - draw line 17-32 and extend it = 45
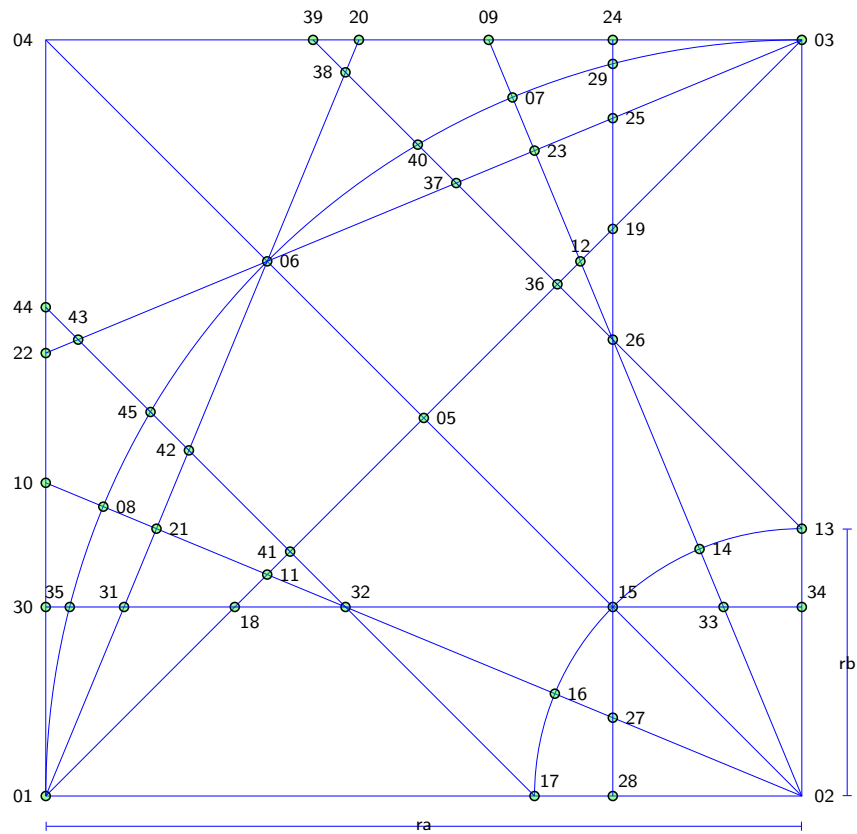
1.4.13 Step 13 - draw pattern line 01-31-15-25-03
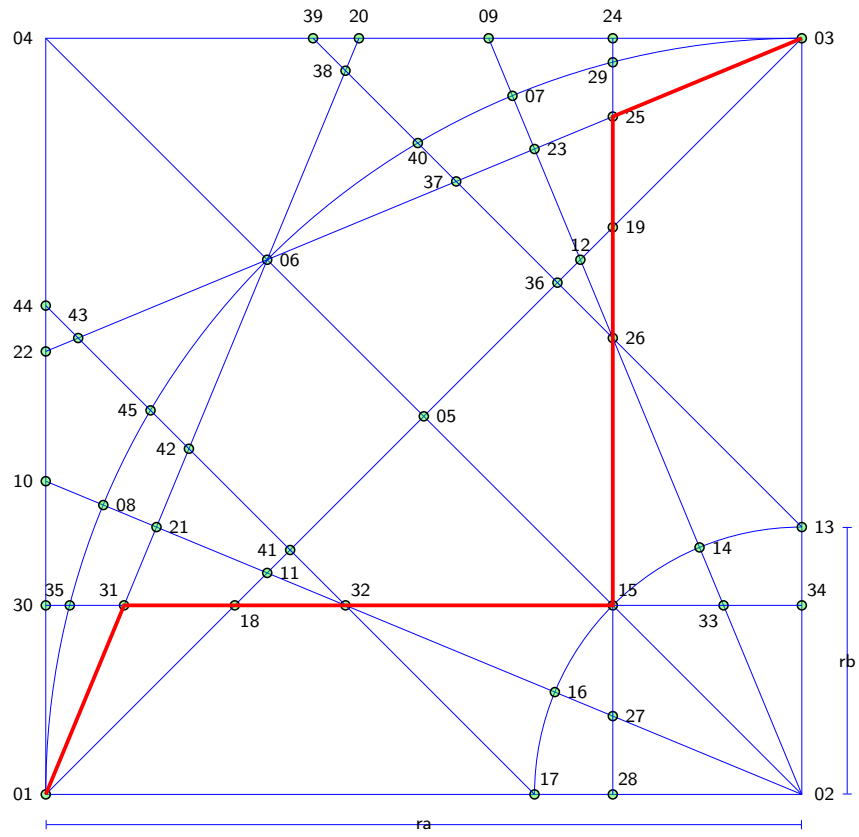
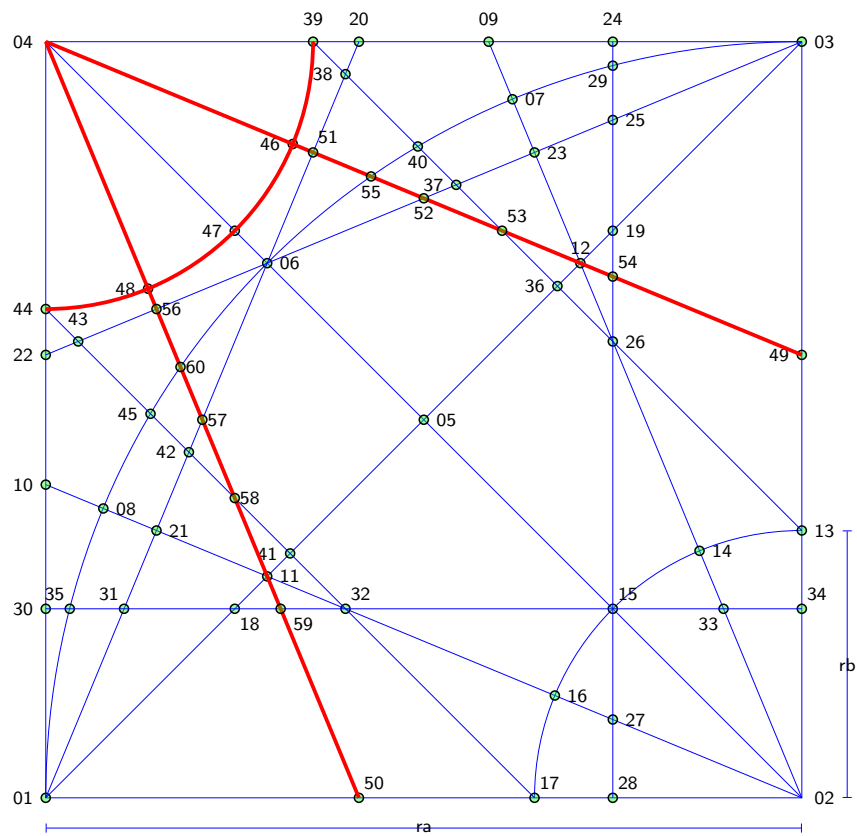### 1.4.14 Step 14 - draw pattern lines 01-31-15-25-03 and 22-37-13-33-15-27-17-42-20
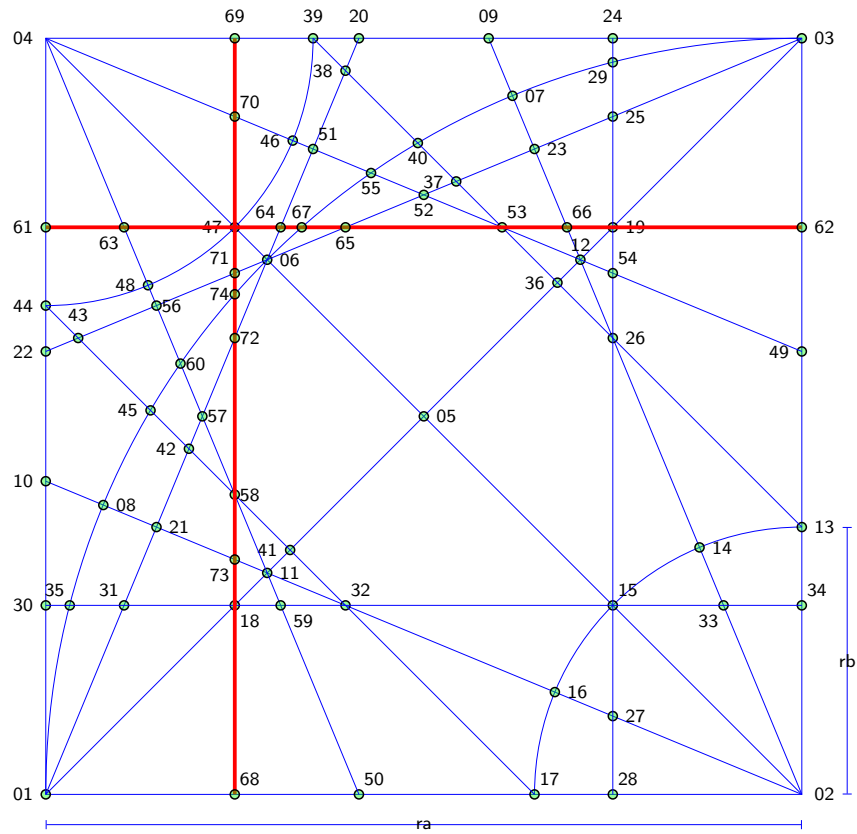
2 Alternate Design I

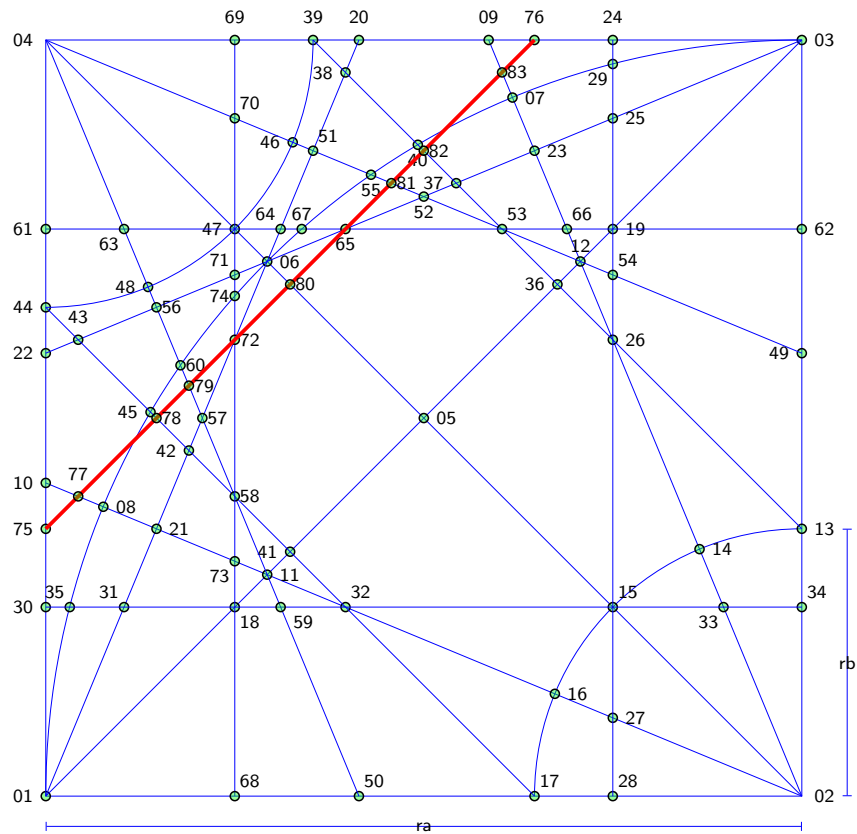## 2.0.1 Step 12 - draw line 17-32 and extend it = 45

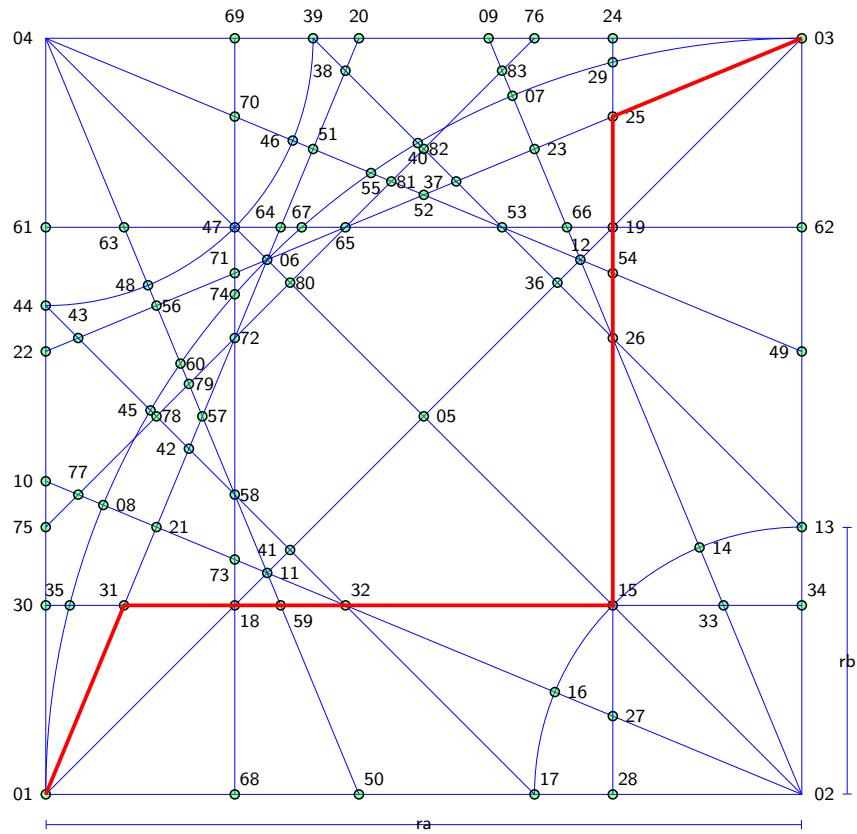## 2.0.2 Step 13 - draw arc at 04 with radius rb and divide in 4 parts = 60

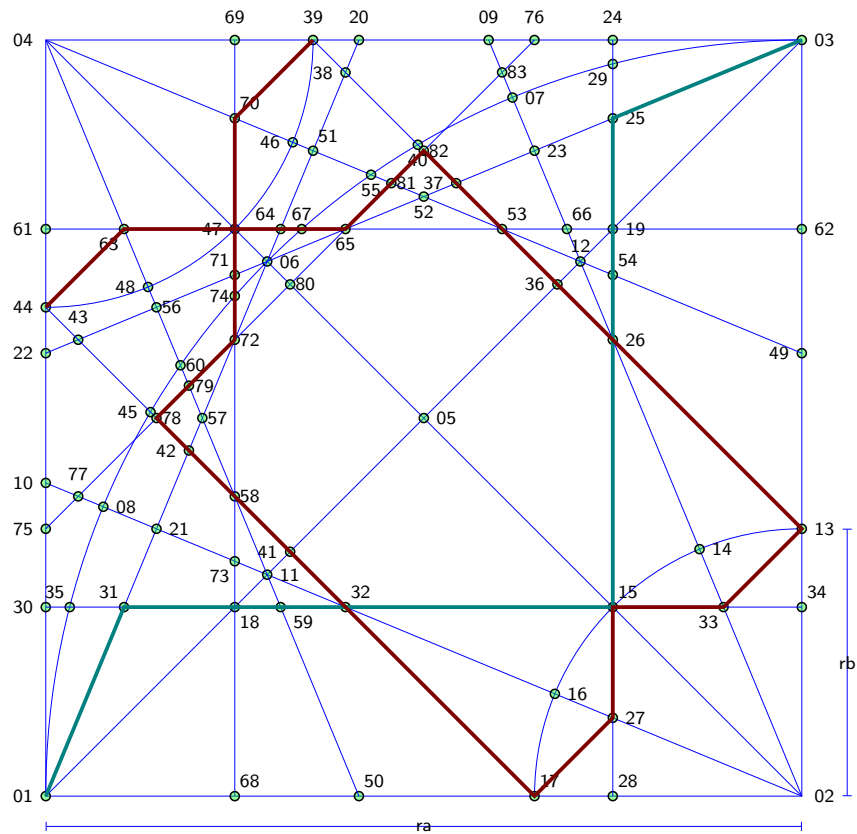### 2.0.3 Step 14 - draw horizontal and vertical lines through 47 = 74

2.0.4 Step 15 - draw line 72-65 and extend = 83

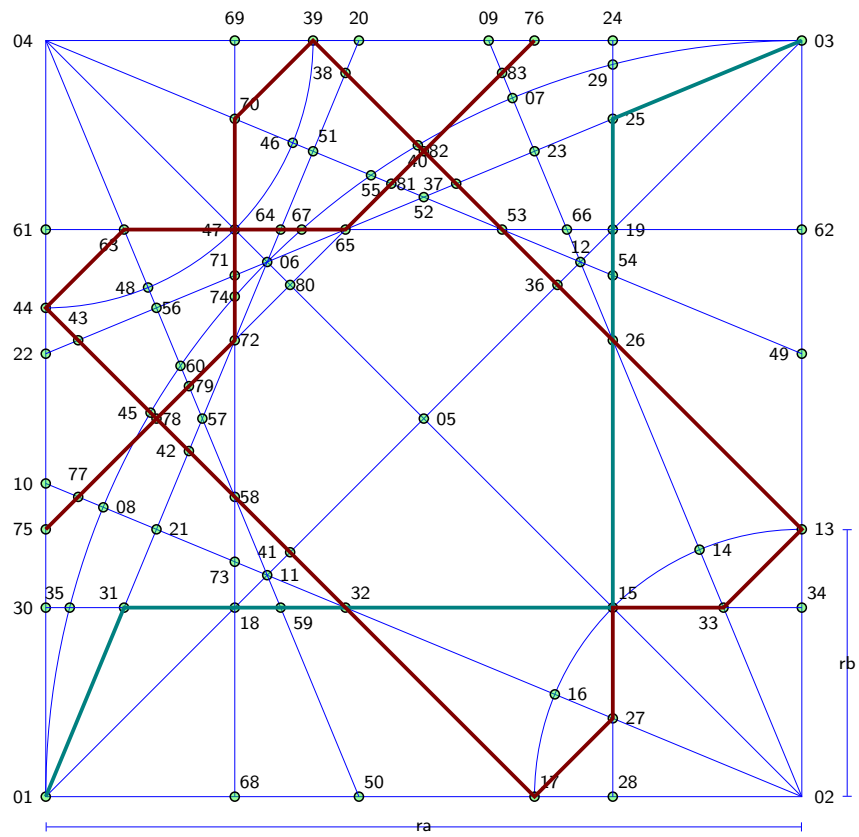### 2.0.5 Step 16 - draw pattern line 01-31-15-25-03

2.0.6 Step 17 - draw pattern line 44-63-65-82-13-33-15-27-17-78-72-70-39
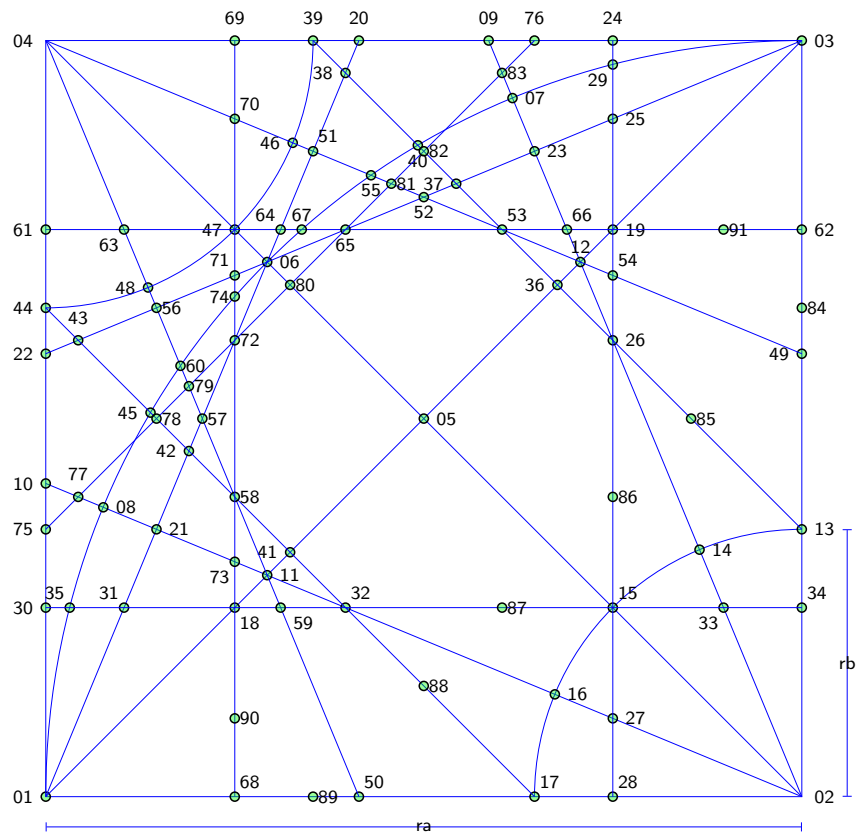
3 Alternate Design II

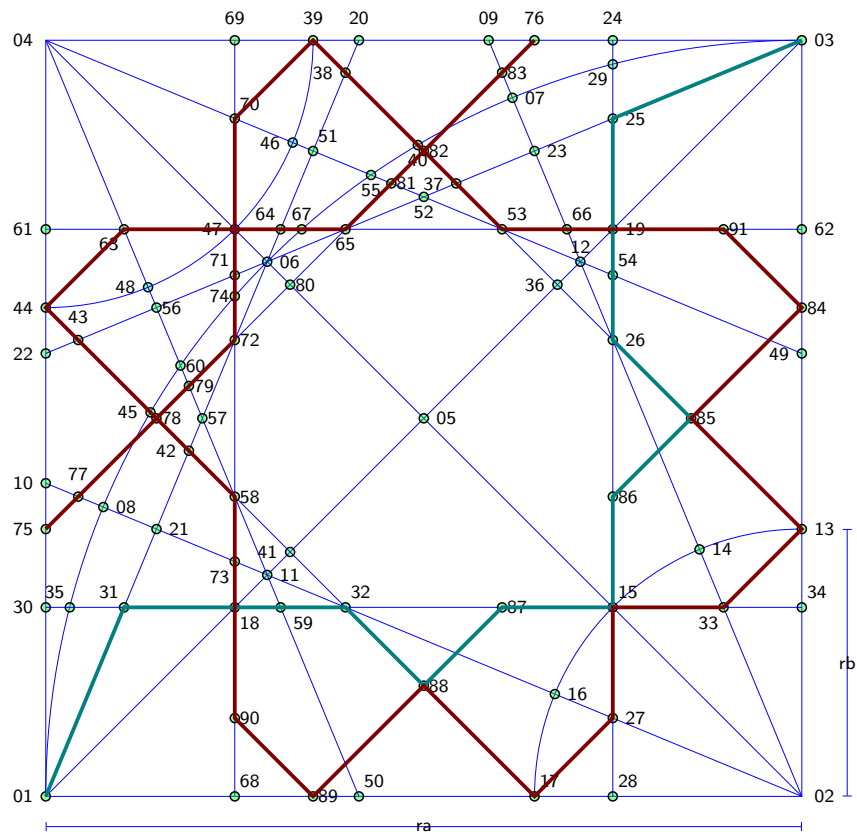### 3.0.1 Step 20 - draw pattern line draw pattern line 75-72-70-39-13-33-15-27-17-44-63-65-76

4 Alternate Design III

4.0.1 Step 20 - mirror points 44-84,78-85,58-86,32-87,82-88,39-89,27-90,33-91 = 91
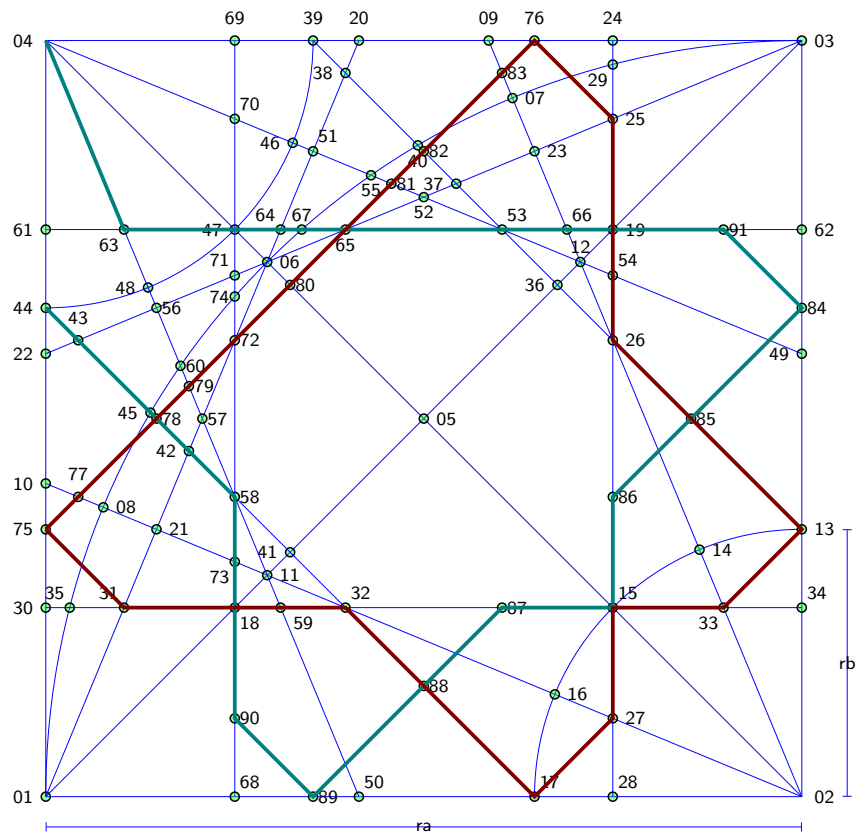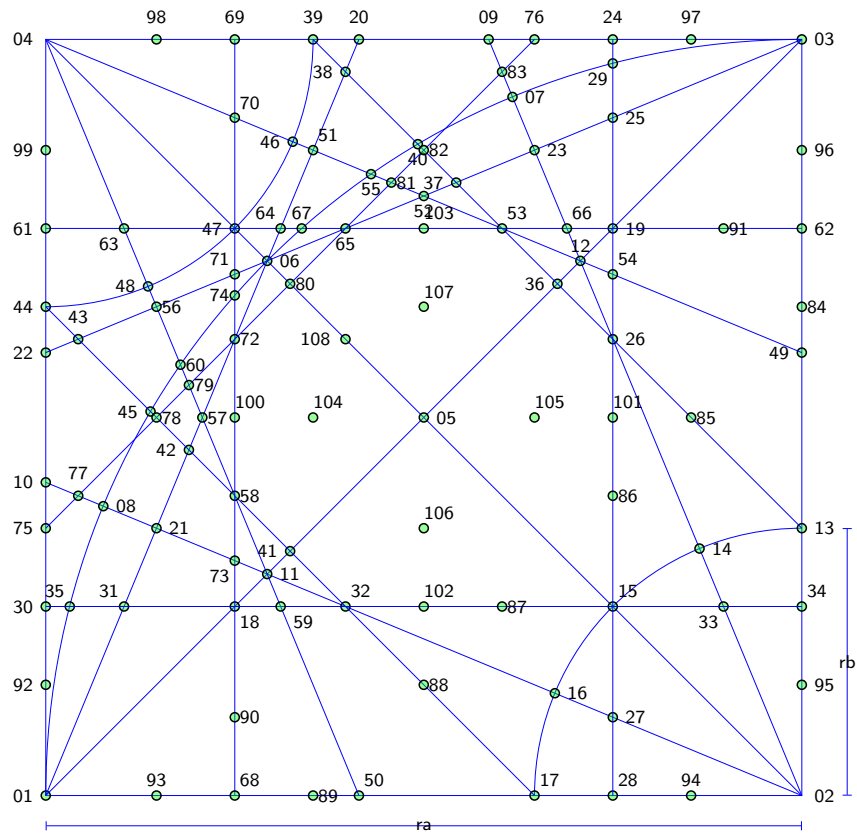

4.0.2 Step 2 - draw pattern lines
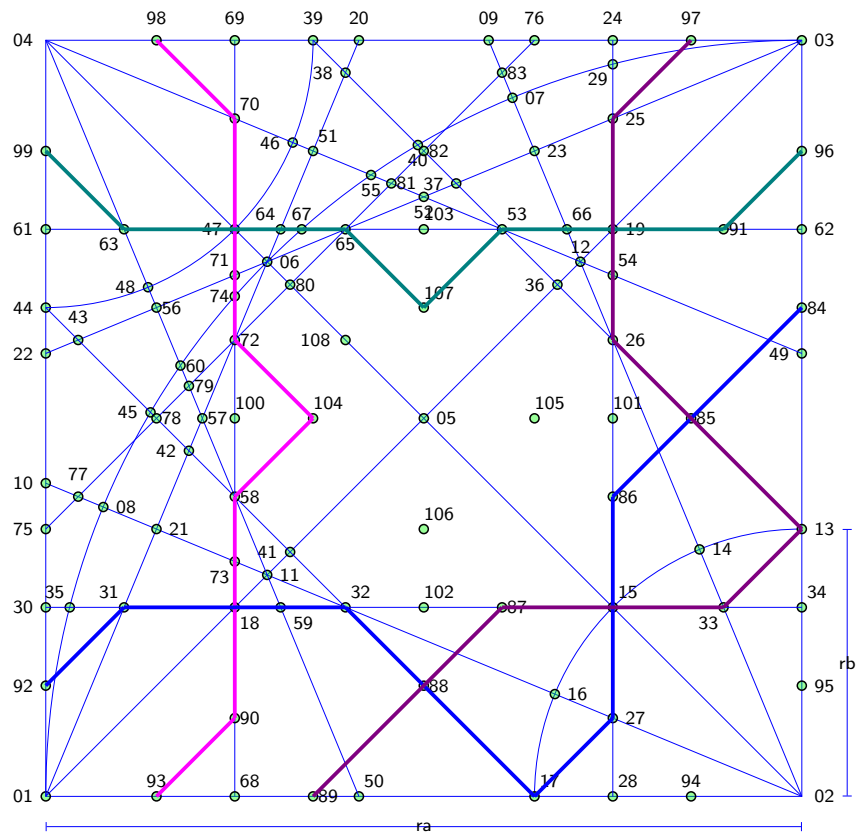
5 Alternate Design IV

5.0.1 draw pattern lines
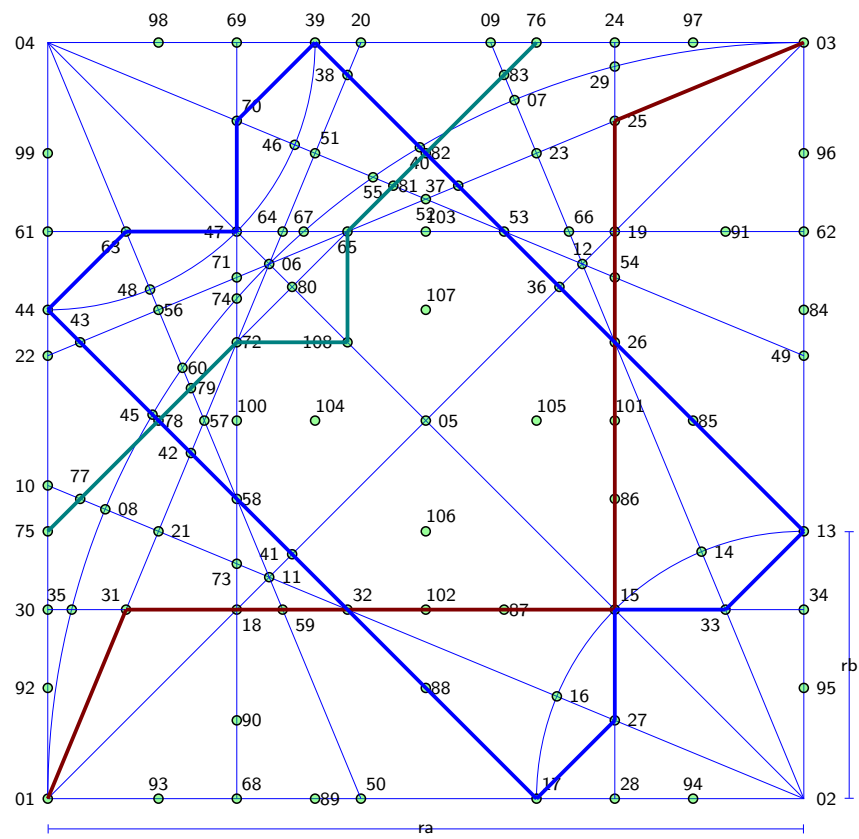
6 Alternate Design V

6.0.1 mirror nodes

6.0.2 draw pattern lines

7 Alternate Design VI

7.0.1 draw pattern lines

8 Node Coordinates

ptI{0,0}% 1
ptII{100,0}% 2
ptIII{100,100}% 3
ptIV{0,100}% 4
ptV{50,50}% 5
ptVI{29.2893,70.7107}% 6
ptVII{61.7317,92.388}% 7
ptVIII{7.612,38.2683}% 8
ptIX{58.5786,100}% 9
ptX{0,41.4214}% 10
ptXI{29.2886,29.2887}% 11
ptXII{70.7113,70.7114}% 12
ptXIII{100,35.3553}% 13
ptXIV{86.4701,32.664}% 14
ptXV{75,25}% 15
ptXVI{67.336,13.5299}% 16
ptXVII{64.6447,-0}% 17
ptXVIII{25,25}% 18
ptXIX{75,75}% 19
ptXX{41.4216,100}% 20
ptXXI{14.6443,35.3543}% 21
ptXXII{0,58.58}% 22
ptXXIII{64.6457,85.3557}% 23
ptXXIV{75,100}% 24
ptXXV{75,89.645}% 25
ptXXVI{75,60.355}% 26
ptXXVII{75,10.3553}% 27
ptXXVIII{75,0}% 28
ptXXIX{75,96.8246}% 29
ptXXX{0,25}% 30
ptXXXI{10.3554,25}% 31
ptXXXII{39.6447,25}% 32
ptXXXIII{89.6447,25}% 33
ptXXXIV{100,25}% 34
ptXXXV{3.1754,25}% 35
ptXXXVI{67.6776,67.6777}% 36
ptXXXVII{54.2889,81.0664}% 37
ptXXXVIII{39.6448,95.7105}% 38
ptXXXIX{35.3553,100}% 39
ptXL{49.2123,86.143}% 40
ptXLI{32.3224,32.3223}% 41
ptXLII{18.9341,45.7106}% 42
ptXLIII{4.2884,60.3563}% 43
ptXLIV{0,64.6447}% 44
ptXLV{13.857,50.7877}% 45
ptXLVI{32.664,86.4701}% 46
ptXLVII{25,75}% 47
ptXLVIII{13.5299,67.336}% 48
ptXLIX{100,58.5786}% 49
ptL{41.4214,0}% 50
ptLI{35.3557,85.3557}% 51
ptLII{50,79.29}% 52
ptLIII{60.3539,75.0014}% 53
ptLIV{75,68.935}% 54

ptLV{43.0229,82.1799}% 55
ptLVI{14.6443,64.6457}% 56
ptLVII{20.7108,50}% 57
ptLVIII{25.0002,39.6445}% 58
ptLIX{31.0662,25}% 59
ptLX{17.8204,56.978}% 60
ptLXI{0,75}% 61
ptLXII{100,75}% 62
ptLXIII{10.3553,75}% 63
ptLXIV{31.0662,75}% 64
ptLXV{39.6427,75}% 65
ptLXVI{68.9338,75}% 66
ptLXVII{33.8562,75}% 67
ptLXVIII{25,0}% 68
ptLXIX{25,100}% 69
ptLXX{25,89.6447}% 70
ptLXXI{25,68.935}% 71
ptLXXII{25,60.355}% 72
ptLXXIII{25,31.065}% 73
ptLXXIV{25,66.1438}% 74
ptLXXV{0,35.35}% 75
ptLXXVI{64.6371,100}% 76
ptLXXVII{4.2916,39.6425}% 77
ptLXXVIII{14.6459,49.9988}% 78
ptLXXIX{18.9345,54.2883}% 79
ptLXXX{32.3218,67.6783}% 80
ptLXXXI{45.7084,81.0675}% 81
ptLXXXII{49.9977,85.3577}% 82
ptLXXXIII{60.3532,95.7153}% 83
ptLXXXIV{100,64.6447}% 84
ptLXXXV{85.3541,49.9988}% 85
ptLXXXVI{74.9998,39.6445}% 86
ptLXXXVII{60.3553,25}% 87
ptLXXXVIII{49.9977,14.6423}% 88
ptLXXXIX{35.3553,0}% 89
ptXC{25,10.3553}% 90
ptXCI{89.6447,75}% 91
ptXCII{0,14.6446}% 92
ptXCIII{14.6446,0}% 93
ptXCIV{85.3554,0}% 94
ptXCV{100,14.6446}% 95
ptXCVI{100,85.3554}% 96
ptXCVII{85.3554,100}% 97
ptXCVIII{14.6446,100}% 98
ptXCIX{0,85.3554}% 99
ptC{25.0012,49.9988}% 100
ptCI{74.9988,49.9988}% 101
ptCII{49.9977,24.9976}% 102
ptCIII{49.9977,75.0024}% 103
ptCIV{35.3565,49.9988}% 104
ptCV{64.6435,49.9988}% 105
ptCVI{49.9977,35.3529}% 106
ptCVII{49.9977,64.6471}% 107
ptCVIII{39.6446,60.355}% 108