An implementation of an exact algorithm for the Boolean Satisfiability Problem

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Abstract. *This report mainly presents an implementation of DPLL, an exact algorithm for the satisfiability problem, together with experimental results. We also present a state-of-the-art for exact algorithms relating to this problem. It is worth mentioning that this is a graded assignment for the discipline of Algorithms Analysis and Projects of the Federal University of Rio Grande do Norte.*

1. Introduction

The boolean satisfiability problem (SAT) involves determining if a logical formula can be satisfied. Despite its straightforward definition, SAT has several practical applications across several fields. For example, SAT can be used for software and hardware verification, artificial intelligence, and bio-informatics [Marques-Silva 2008]. These diverse applications demonstrate the problem's impact across both theoretical and practical worlds.

SAT has became one of the main problems in the fields of computer science and mathematics. Not only because of its practical applications, but for its high difficulty. SAT is the first problem to be proved NP-complete [Cook 1971]. Therefore, solving SAT proves that P=NP, leading to great advance in the computer science field.

Among many algorithm to solve SAT, we chose to implement `DPLL`, which is a backtracking algorithm that uses an heuristic to choose the most promising branch on the search space. This way, the algorithm prunes some branches of the search tree, gaining efficiency.

The report is structured as follows: Section 2 defines the SAT problem. Section 3 presents the state-of-the-art for exact algorithms for the SAT problem. Section 4 explains about `DPLL`. Section 5 show the implementation details of `DPLL`. Section 6 contains the empirical analysis results, where we also compare with `CIDPLL`, the heuristic for SAT we developed in a previous work. Section 7 discuss the results. Finally, Section 8 concludes this report.

2. Background

2.1. Conjuctive Normal Form (CNF)

A propositional logic formula is said to be in the Conjuctive Normal Form if it has the form:

$$P_1 \wedge P_2 \wedge \cdots \wedge P_n$$

where P_i is a disjunction of positive or negative literals. Formally, P_i is written as:

$$Q_1 \vee Q_2 \vee \cdots \vee Q_n$$

and Q_i is x or $\neg x$ for a variable x.

An example of CNF formula is: $(x \vee y \vee \neg z) \wedge (x \vee \neg y) \wedge (\neg w \vee x)$

A common notation to express these formulas is the set notation. In this notation, the formula is represented as a set of clauses. Each clause is represented as a set of literals. For example, the formula $\Delta = (x \vee y \vee \neg z) \wedge (x \vee \neg y) \wedge (\neg w \vee x)$ can be written as follows:

$$\Delta = \{\{x, y, \neg z\}, \{x, \neg y\}, \{\neg w, x\}\}$$

2.2. SAT problem

The satisfiability problem is defined as follows: Given a CNF formula, return an assignment of the variables such that the formula becomes true, or answer that the formula is unsatisfiable.

More formally, the input is a string which is guaranteed to be a valid CNF formula. The output should be a function $\alpha : X \to \{0, 1\}$ such that the evaluation of the formula from this assignment is 1. Here, X is the set of variables present in the formula. If such function does not exist, answer accordingly.

2.3. P-Resolvents

Suppose that Δ is a CNF which contains clauses C_i and C_j such that one contains the literal p and the other $\neg p$. The resolution inference rule allows us to derive $(C_i - \{p\}) \cup (C_j - \{\neg p\})$. This derived set is called a *resolvent* on the variable p, also called p-resolvent. For example, an y-resolvent of $\Delta = \{\{x, y, \neg z\}, \{x, \neg y\}, \{\neg w, x\}\}$ is $\{x, \neg z\}$, obtained by using $C_i = \{x, y, \neg z\}$ and $C_j = \{x, \neg y\}$.

Resolvents have many properties involving existential quantifiers. Furthermore, these properties will be used on some algorithms ideas. By using existential quantifiers, one can reduce the amount of variables present in the formula. Therefore, this process will eventually end allowing the algorithms to give a final and exact result.

3. State-of-the-Art

In our analysis, we consider 7 exact algorithms considered to be state-of-the-art on solving 3-SAT: **DPLL**, **CaDiCaL**, **Chaff**, **DP**, **Deletion Algorithm** and **Stålmarck's Algorithm**. We will discuss them in the following subsections, except for **DPLL**, which will be discussed in Section 4. It is worth noting the presence of solutions utilizing quantum computers, normally reducing the problem to a Quadratic unconstrained binary optimization (QUBO), which we won't consider in our analysis.

3.1. CaDiCaL

CaDiCaL is an algorithm based on Conflict-Driven Clause Learning (CDCL), which was implemented in C under the name Kissat and won the first place in SAT Competition 2020 [Biere and contributors 2020].

CDCL consists of performing a backtrack search until a conflict is found, that is, a situation where currently no value attributed to the variables can satisfy the expression,

such as when there are two unit clauses with x and $\neg x$ where x is a variable. It then generates a new clause by including literals corresponding to the variables involved in the conflict, with polarities opposite to their assignments. To determine such assignments, CDCL relies on an acyclic directed graph, called an Implication graph. In it, vertices are variables and their respective assingments, and edges exists between nodes A, B if A lead to the direct assignment of B. For example, in $\{\{\neg x\}, \{x, y\}\}$, assigning x with 0, leads to $\{\{y\}\}$, which makes y be assigned with 1, therefore the node $(x, 0)$ has an edge pointing to $(y, 1)$.

The acquisition of new clauses gives more information to the algorithm than a normal backtrack, allowing it to cut off greater sections of the search space by doing non-chronological backtracking, in other words, going back multiple steps. More specifically, the algorithm returns to the oldest assignment of the of the variables in the conflict clause.

3.2. Chaff

Chaff [Moskewicz et al. 2001] is a variation of DPLL with a set of new features, including: an optimized Boolean Constraint Propagation (BCP), Variable State Independent Decaying Sum (VSIDS) Decision Heuristic, Clause Deletion and Restarts. All with the objective of improving time and memory performance.

The BCP step in DPLL based algorithms consists of assigning a value to the variables in unit clauses, making sure their literal's are true, which they must be to satisfy the whole expression. This is the step where DPLL based algorithms spend the most time, therefore an optimized BCP results in a faster run time.

VSIDS is the decision heuristic utilized in DPLL based algorithms. It keeps a counter for each literal, in other words variables distinguished by polarity, and increments based on the literals of the clauses that are added, also dividing the counters by a constant periodically. Then, the variable and its respective value are decided in such a way that the literal with the highest counter is true, with ties decided at random.

Clause Deletion prevents exaggerated memory usage by eliminating clauses learned by CDCL deemed irrelevant during execution. The metric for irrelevancy is the number of literals that will be unassigned for the first time in a clause, if that number is great enough, the clause is marked as deleted.

Restarts is a technique that consists of restarting the search from the beginning, that is, unassigned all variables, while still keeping knowledge from past runs, such as learned clauses. The new initial knowledge means the algorithm won't repeat what it did in a past run and this helps it get unstuck in certain situations.

3.3. Davis-Putnam algorithm (DP)

As said in Section 2.3, existential quantifiers share properties with resolvents. The most relevant property for solving SAT is that Δ is satisfiable if and only if $\exists p\Delta$. The latter formula has fewer variables than Δ (if Δ mentions p). Therefore, each variable of Δ can be quantified sequentially, leading to a formula without any variables. With this formula, its then possible to conclude if Δ is satisfiable or not.

The DP algorithm is an implementation of this method. The algorithm is based on following property. Consider Δ a CNF formula, by adding all the p-resolvents to Δ

and removing all the clauses that contain p or $\neg p$, you obtain a new formula equivalent to $\exists p\Delta$. Notice that the resultant formula does not contain any free occurrence of p. Hence, the step of quantifying the formula decreases the number of variables in Δ.

The DP algorithm does that by separating the clauses into buckets. Each variable has its own bucket. The clauses are put in the bucket of its first variable according to a fixed variable order π. After that, the buckets are processed in the variable order. For each bucket, the algorithm iterates through all the resolvents of its variable (v), putting the resolvents on the next buckets according to the resolvent's first variable. This process represents the result of existentially quantifying the variable v. If this process completes without generating any empty resolvents, the formula is satisfiable.

The algorithm's efficiency depends on the variable order. The order can make several clauses to be accumulated in a single bucket resulting in a increased cost to find the resolvents. This way, the variable order needs to be chosen carefully to ensure the best performance. However, choosing a suitable variable order, the algorithm is still exponential on the treewidth of this *connectivity graph*. The connectivity graph is an undirected graph over the variables of Δ, where there exists an edge iff the two variables share a clause in Δ.

3.4. Deletion Algorithm

The Deletion Algorithm [Díaz-Macías and Moral 2022] is an improvement of DP, using a more efficient deletion technique, which consists of a more sophisticated marginalization algorithm. These are algorithms that identify a certain variable for removal in the current expression.

A key part of the proposed algorithm is identifying variables that are functionally dependent on others, which speeds up calculations. Functional dependency happens when a set of variables completely determines the value of a certain variable.

For this reason, the algorithm is better suited for cases where a variable is dependent on a set of variables, in other words, in high tree-width connectivity graphs.

3.5. Stålmarck's Algorithm

Stålmarck's algorithm [Stalmarck 1994, Biere et al. 2009] is an algorithm to check if an formula is a tautology. The algorithm is designed taking account arbitrary formulas, not necessary CNF's. This algorithm is not built to solve the SAT problem directly. However, the algorithm is still relevant to the problem because a formula is unsatisfiable iff its negative form is a tautology.

The algorithm starts with a preprocessing step that simplifies the formula. This step removes double negations and transforms implications into disjunctions using inference rules. At this point, if the algorithm can determine the formulas value, it terminates. Otherwise, the algorithm proceeds to the next part.

In the next step, the algorithm transforms the preprocessed formula in a triple $v \iff (p \iff q)$ or $v \iff (p \wedge q)$. Here, v is a variable and p and q are literals. This process is recursive. This means that p and q can be subformulas transformed into biimplications by the algorithm. After this step, the algorithm assumes that the formula

is false and tries to derive a contradiction by exhaustily applying a set of logical rules [Harrison 1996].

Stålmarck's Algorithm advantage is the fact that it can process formulas with quantifiers, making it more generic. Additionally, the algorithm inference rules make it efficient in solving Horn clauses. Horn clauses are clauses that contain at most one positive literal. This fact happens because Horn clauses have a natural correspondence with implications. For example, $\neg A \vee \neg B \vee C$ is equivalent to $(A \wedge B) \implies C$

4. `DPLL` algorithm

Davis–Putnam–Logemann–Loveland (`DPLL`) is a complete search algorithm for deciding the satisfiability of a CNF formula. It is essentially a backtracking algorithm, designed to work with an heuristic to choose the next variable to be assigned. For this reason, `DPLL` is considered to be a family of algorithms, since the chosen heuristic can change the algorithm's efficiency.

`DPLL` is described at Algorithm 1. Here, we define an auxiliary function `apply`, which receives a formula, a variable and a boolean. This function is responsible returning the reduced formula when the variable is assigned the respective boolean value. Some possible reduction steps the `apply` function uses are:

- $A \vee 0 = A$
- $A \vee 1 = 1$
- $A \wedge 0 = 0$
- $A \wedge 1 = A$

Moreover, we have the function `next_variable`, which is the heuristic responsible for deciding the next variable to have its value assigned. Additionally, the notation $\alpha[x \leftarrow v]$ can be read as "the same assignment as α but the variable x is assigned to value v".

Algorithm 1 DPLL

Input: A set of clauses Φ
Output: A solution to satisfy Φ
function DPLL(Φ, α)
  if Φ `has empty clause` **then return** `no solution`
  end if
  if Φ `has no clauses` **then return** α
  end if
  if Φ `has a clause with exactly one literal` l **then**
    if $l = \neg x$ **then return** DPLL(apply(Φ, x, 0), $\alpha[x \leftarrow 0]$)
    else
  return DPLL(apply(Φ, x, 1), $\alpha[x \leftarrow 1]$)
    end if
  end if
  var $\leftarrow$ next_variable(Φ)
  return DPLL(apply(Φ, var, 0), $\alpha[var \leftarrow 0]$) **or**
DPLL(apply(Φ, var 1), $\alpha[var \leftarrow 1]$)
end function

5. Implementation of `DPLL`

In our implementation, we opted for an object-oriented approach in C++ and created two classes that represent a clause and a set of clauses. These classes contain methods which are a direct reflection from the pseudo-code found Algorithm 1. For example, the ClauseSet class contains methods to determine the size of the set, the presence of empty clauses, unit clauses, etc., with the most important one being the `apply` method.

This method loops through the clause set applying the transformations described at Section 4. These changes are done to a copy of the object of which the function was called from. Finally, it then returns a pointer to this copy.

With this structure in mind, we made the `DPLL` method receive a pointer to a ClauseSet, because it fits well with `apply`, resulting in a very similar syntax to Algorithm 1. Besides this argument, `DPLL` also receives a string that contains the current solution; since each call decides the value of a variable, successive calls store the solution specifically for that series of decisions, which is appropriate for backtracking.

For the decision heuristic, we opted to use DLIS, discussed in the section below.

5.1. `DLIS`

`DLIS` consists of selecting the variable with the most occurrences in the formula. The main goal of this heuristic is to reduce the formula as most as possible. This way, the algorithm reaches a base case faster, reducing execution time.

Our implementation of `DLIS` consists of iterating for all possible variables and then checking all possible clause sizes. For each clause size, iterate all clauses of that size and count the current variable occurrences. This process can be seen at Algorithm 2

Algorithm 2 DLIS

```
Input: Φ a clause set
Output: The variable with most occurrences in Φ
function DLIS(Φ)
    best: Var
    max ← −∞
    for x in Φ.Variables do
        count ← 0
        k ← Φ.Biggest_Clause_Size()
        for i in [1 ... k] do
            for c in Φ.Clauses_With_Size(i) do count ← count + occurrences(c, x)
            end for
        end for
        if count ≥ max then
            best ← x
            max ← count
        end if
    end for
     return best
end function
```

Assuming that Φ is always reduced, we can infer that the size of each clause is $O(v)$. Where v is the number of variables appearing in the formula. This is true because on each clause, a variable can appear at most once, being on either a positive or negative literal. Otherwise, the formula could be further reduced. Therefore, k is $O(v)$.

`Biggest_Clause_Size` is $O(c)$, where c is the number of clauses in Φ, since it needs to iterate through all clauses in Φ. We use a similar argument to discuss that `Clauses_With_Size` is also $O(c)$. Finally, `occurrences(c,` x`)` is $O(v)$ because it is bounded on the size of the clause c. Therefore, the overall asymptotic complexity of `DLIS` is $O(vc + v^3c) = O(v^3c)$

5.2. Total complexity analysis

In its worst case, `DPLL` will explore the entire solution space, making a single call for all of the 2^v elements. Each call with $O(v^3c)$ complextity (as seen in Section 5.1), since `DLIS` is the most expensive part in the algorithm, therefore the worst case complexity of `DPLL` is $O(2^v v^3 c)$.

6. Experiment description and results

The experiments where run on a machine with the following specifications:

- System type: 64x
- Processor: Intel(R) Core(TM) i7-8750H CPU @2.20GHz 2.21GHz
- Memory: 16GB
- OS: Windows10, Version: 22H2
- Language: C++ version 11 compiled with g++ version 8.1.0.

For this report, we utilized the SATLIB - Benchmark Problems database of instances of the SAT problem [Hoos and Stützle 2024]. The scope was limited for 1000 samples, each one with 20 variables and 91 clauses, all satisfiable. These samples, containing boolean expressions in the conjunctive normal form, were stored in `.cnf` files.

The experiments consisted of reading the contents of each file and applying `DPLL` and `CIDPLL` to the expressions they stored. In this, the former had an average execution time of 0.019781 seconds and the latter 0.007344 seconds, both with 6 decimal places of precision.

The code and the test instances are stored in the work's GitHub repository [Gabriel and Eduardo 2024].

The table with each individual result can be found below, where:

- **name**: the name of the test file;
- **timeDPLL**: the time it took for `DPLL` to execute in seconds;
- **timeCIDPLL**: the time it took for `CIDPLL` to execute in seconds;
- **is_correct**: whether `CIDPLL` output's is correct.

name	timeDPLL	timeCIDPLL	is_correct
uf20-01.cnf	0.0459907	0.0069947	0
uf20-010.cnf	0.0159991	0.0069992	1
uf20-0100.cnf	0.0319978	0.0069984	0
uf20-01000.cnf	0.0280351	0.0070018	0
uf20-0101.cnf	0.0329989	0.0079979	0
uf20-0102.cnf	0.0179919	0.0059991	0
uf20-0103.cnf	0.0140071	0.007999	1
uf20-0104.cnf	0.0050177	0.0079951	1
uf20-0105.cnf	0.0250026	0.0069984	0
uf20-0106.cnf	0.0140085	0.007999	0
uf20-0107.cnf	0.0330127	0.0079983	0
uf20-0108.cnf	0.0120016	0.0079995	0
uf20-0109.cnf	0.0089989	0.0069988	0
uf20-011.cnf	0.0090007	0.0080006	1
uf20-0110.cnf	0.0150028	0.0079983	1
uf20-0111.cnf	0.0220339	0.0069992	0
uf20-0112.cnf	0.0139814	0.0089999	0
uf20-0113.cnf	0.0219995	0.0079984	0
uf20-0114.cnf	0.0160348	0.005968	0
uf20-0115.cnf	0.0089996	0.0059992	0
uf20-0116.cnf	0.0170478	0.0069986	0
uf20-0117.cnf	0.0100113	0.0069979	0
uf20-0118.cnf	0.0269931	0.0079975	0
uf20-0119.cnf	0.0180343	0.0039976	0
uf20-012.cnf	0.0070069	0.0069986	1
uf20-0120.cnf	0.0239995	0.0049983	0
uf20-0121.cnf	0.0269644	0.0069989	1
uf20-0122.cnf	0.0149989	0.0069966	0
uf20-0123.cnf	0.023996	0.0149986	0
uf20-0124.cnf	0.0100004	0.008001	0
uf20-0125.cnf	0.0050538	0.0090338	0
uf20-0126.cnf	0.0080467	0.0119908	0
uf20-0127.cnf	0.0109626	0.0090009	0
uf20-0128.cnf	0.0130002	0.0070001	0
uf20-0129.cnf	0.053035	0.01398	0
uf20-013.cnf	0.0089991	0.0059926	0
uf20-0130.cnf	0.0110007	0.0079991	0
uf20-0131.cnf	0.0069999	0.0089987	1
uf20-0132.cnf	0.0260023	0.0079968	0
uf20-0133.cnf	0.0369909	0.0079993	0
uf20-0134.cnf	0.0109992	0.0079999	1
uf20-0135.cnf	0.0150011	0.0089984	0
uf20-0136.cnf	0.0339649	0.0069991	0

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name	timeDPLL	timeCIDPLL	is_correct
uf20-0137.cnf	0.0100375	0.0059989	0
uf20-0138.cnf	0.0080018	0.0099991	0
uf20-0139.cnf	0.0079975	0.008001	0
uf20-014.cnf	0.0359935	0.0059993	0
uf20-0140.cnf	0.0070231	0.0089985	0
uf20-0141.cnf	0.0329978	0.0069994	0
uf20-0142.cnf	0.0150042	0.0099942	1
uf20-0143.cnf	0.0110345	0.005998	0
uf20-0144.cnf	0.0090014	0.0089988	1
uf20-0145.cnf	0.0220328	0.0069983	0
uf20-0146.cnf	0.0479958	0.0069974	0
uf20-0147.cnf	0.0200332	0.0059983	0
uf20-0148.cnf	0.0080348	0.0049982	0
uf20-0149.cnf	0.0279704	0.006998	0
uf20-015.cnf	0.0079945	0.0069984	0
uf20-0150.cnf	0.0079964	0.0079996	1
uf20-0151.cnf	0.0280102	0.0070117	0
uf20-0152.cnf	0.0189988	0.0059988	0
uf20-0153.cnf	0.0130301	0.005998	0
uf20-0154.cnf	0.0199769	0.0069986	0
uf20-0155.cnf	0.0299995	0.0079988	1
uf20-0156.cnf	0.0070371	0.0049976	0
uf20-0157.cnf	0.007999	0.0079982	0
uf20-0158.cnf	0.0100028	0.0069983	0
uf20-0159.cnf	0.0200213	0.0079984	0
uf20-016.cnf	0.0290334	0.0079974	0
uf20-0160.cnf	0.0259973	0.0060359	0
uf20-0161.cnf	0.0150104	0.0070152	1
uf20-0162.cnf	0.018999	0.0079986	1
uf20-0163.cnf	0.0190007	0.0079988	1
uf20-0164.cnf	0.0159993	0.0080001	1
uf20-0165.cnf	0.0109647	0.0080013	0
uf20-0166.cnf	0.0120158	0.006998	0
uf20-0167.cnf	0.0210521	0.0059982	0
uf20-0168.cnf	0.0220226	0.007	0
uf20-0169.cnf	0.0100251	0.008999	1
uf20-017.cnf	0.0190084	0.0059992	0
uf20-0170.cnf	0.0219766	0.0079963	1
uf20-0171.cnf	0.0070023	0.0069978	1
uf20-0172.cnf	0.0179997	0.0079991	0
uf20-0173.cnf	0.0100312	0.0079968	0
uf20-0174.cnf	0.0050381	0.0069994	1
uf20-0175.cnf	0.0210371	0.0159944	0

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name	timeDPLL	timeCIDPLL	is_correct
uf20-0176.cnf	0.0439625	0.0079926	0
uf20-0177.cnf	0.0140357	0.0069988	1
uf20-0178.cnf	0.0130165	0.0089995	1
uf20-0179.cnf	0.0400102	0.0079965	0
uf20-018.cnf	0.0170097	0.0069988	0
uf20-0180.cnf	0.0219949	0.0059987	0
uf20-0181.cnf	0.018968	0.0049982	0
uf20-0182.cnf	0.0109664	0.0049996	0
uf20-0183.cnf	0.030036	0.0060008	0
uf20-0184.cnf	0.018998	0.0079995	0
uf20-0185.cnf	0.0080028	0.0059985	0
uf20-0186.cnf	0.0309973	0.0079985	0
uf20-0187.cnf	0.0220092	0.006	0
uf20-0188.cnf	0.0089986	0.0089984	0
uf20-0189.cnf	0.0089972	0.0089984	1
uf20-019.cnf	0.0090318	0.0059986	0
uf20-0190.cnf	0.007999	0.0069989	0
uf20-0191.cnf	0.0090009	0.0049988	0
uf20-0192.cnf	0.010968	0.0079988	0
uf20-0193.cnf	0.0190385	0.0069984	0
uf20-0194.cnf	0.0060317	0.0059972	0
uf20-0195.cnf	0.0199945	0.0079985	1
uf20-0196.cnf	0.0080004	0.006999	0
uf20-0197.cnf	0.0290339	0.0079992	1
uf20-0198.cnf	0.017002	0.0129984	0
uf20-0199.cnf	0.0359888	0.0069997	0
uf20-02.cnf	0.0119986	0.0059974	0
uf20-020.cnf	0.0190333	0.0050082	0
uf20-0200.cnf	0.0119982	0.0069985	0
uf20-0201.cnf	0.0140246	0.0080004	0
uf20-0202.cnf	0.0080236	0.007997	0
uf20-0203.cnf	0.0459942	0.008998	1
uf20-0204.cnf	0.0219963	0.0079985	1
uf20-0205.cnf	0.0529941	0.0089992	0
uf20-0206.cnf	0.0100375	0.0059988	0
uf20-0207.cnf	0.0379989	0.0079987	0
uf20-0208.cnf	0.0089972	0.008999	0
uf20-0209.cnf	0.0230339	0.0059991	0
uf20-021.cnf	0.0219925	0.0059978	0
uf20-0210.cnf	0.0289996	0.0089994	1
uf20-0211.cnf	0.0090367	0.0079993	0
uf20-0212.cnf	0.010033	0.0110017	0
uf20-0213.cnf	0.0070371	0.0059989	1

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name	timeDPLL	timeCIDPLL	is_correct
uf20-0214.cnf	0.014034	0.0059993	0
uf20-0215.cnf	0.0140362	0.0079986	0
uf20-0216.cnf	0.049034	0.009998	0
uf20-0217.cnf	0.0090381	0.0079983	1
uf20-0218.cnf	0.0110028	0.0079992	1
uf20-0219.cnf	0.0370334	0.0049986	0
uf20-022.cnf	0.0080366	0.0079987	1
uf20-0220.cnf	0.0090381	0.004997	0
uf20-0221.cnf	0.028037	0.0089987	0
uf20-0222.cnf	0.0200341	0.0069944	0
uf20-0223.cnf	0.0299999	0.0079985	1
uf20-0224.cnf	0.0240359	0.0099986	0
uf20-0225.cnf	0.0090468	0.0059983	0
uf20-0226.cnf	0.027036	0.0079981	1
uf20-0227.cnf	0.0110268	0.0049987	0
uf20-0228.cnf	0.0120522	0.0089991	0
uf20-0229.cnf	0.0090333	0.007999	1
uf20-023.cnf	0.0140132	0.0089979	0
uf20-0230.cnf	0.0130003	0.0079983	0
uf20-0231.cnf	0.0349992	0.0080005	0
uf20-0232.cnf	0.010027	0.0079991	0
uf20-0233.cnf	0.017998	0.0059986	0
uf20-0234.cnf	0.0109596	0.0059996	0
uf20-0235.cnf	0.0070348	0.0049992	1
uf20-0236.cnf	0.0259971	0.006999	0
uf20-0237.cnf	0.0080355	0.0089988	0
uf20-0238.cnf	0.011052	0.006999	0
uf20-0239.cnf	0.0069649	0.0079986	0
uf20-024.cnf	0.0360366	0.0089983	0
uf20-0240.cnf	0.0090169	0.0079987	1
uf20-0241.cnf	0.0109845	0.007999	0
uf20-0242.cnf	0.008998	0.0059985	0
uf20-0243.cnf	0.0120528	0.0069991	1
uf20-0244.cnf	0.0129974	0.0069995	0
uf20-0245.cnf	0.0199895	0.0069974	0
uf20-0246.cnf	0.0079983	0.0059975	0
uf20-0247.cnf	0.011989	0.0059986	0
uf20-0248.cnf	0.0080007	0.0049982	0
uf20-0249.cnf	0.0239989	0.0049994	0
uf20-025.cnf	0.0170352	0.0049987	0
uf20-0250.cnf	0.0099983	0.0069989	0
uf20-0251.cnf	0.0150355	0.0069999	1
uf20-0252.cnf	0.0169987	0.0059993	0

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name	timeDPLL	timeCIDPLL	is_correct
uf20-0253.cnf	0.0230018	0.0069978	0
uf20-0254.cnf	0.0179944	0.0059994	0
uf20-0255.cnf	0.028	0.0059982	0
uf20-0256.cnf	0.0099998	0.0079995	0
uf20-0257.cnf	0.0279983	0.011999	0
uf20-0258.cnf	0.0150012	0.0089831	0
uf20-0259.cnf	0.0260122	0.0069982	1
uf20-026.cnf	0.0219967	0.0069988	0
uf20-0260.cnf	0.0080018	0.0069988	0
uf20-0261.cnf	0.0159989	0.0069996	0
uf20-0262.cnf	0.023033	0.0079993	0
uf20-0263.cnf	0.0080024	0.0059951	0
uf20-0264.cnf	0.0110516	0.0079988	0
uf20-0265.cnf	0.0160022	0.0079984	0
uf20-0266.cnf	0.0229716	0.0069964	0
uf20-0267.cnf	0.0370387	0.0059982	0
uf20-0268.cnf	0.0230018	0.0119988	0
uf20-0269.cnf	0.0140376	0.01	1
uf20-027.cnf	0.0130076	0.0100028	0
uf20-0270.cnf	0.015036	0.0059989	0
uf20-0271.cnf	0.0090364	0.0079986	1
uf20-0272.cnf	0.016	0.0069987	0
uf20-0273.cnf	0.0080366	0.0069994	1
uf20-0274.cnf	0.0220355	0.0059991	1
uf20-0275.cnf	0.0100739	0.007998	1
uf20-0276.cnf	0.0230319	0.0069989	0
uf20-0277.cnf	0.0340259	0.0039993	0
uf20-0278.cnf	0.0210356	0.0069992	0
uf20-0279.cnf	0.0360362	0.0049976	0
uf20-028.cnf	0.0350437	0.0089969	0
uf20-0280.cnf	0.0300396	0.0079903	0
uf20-0281.cnf	0.0190346	0.0089977	1
uf20-0282.cnf	0.0169994	0.0070273	0
uf20-0283.cnf	0.0160347	0.0080286	0
uf20-0284.cnf	0.0270374	0.0070361	0
uf20-0285.cnf	0.0070349	0.0080237	1
uf20-0286.cnf	0.0290417	0.0060445	0
uf20-0287.cnf	0.0170364	0.0060436	0
uf20-0288.cnf	0.015034	0.0080348	0
uf20-0289.cnf	0.0210371	0.0080426	0
uf20-029.cnf	0.0260368	0.0080381	0
uf20-0290.cnf	0.0260493	0.0049951	0
uf20-0291.cnf	0.0239965	0.0080362	0

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name	timeDPLL	timeCIDPLL	is_correct
uf20-0292.cnf	0.0149985	0.0059952	0
uf20-0293.cnf	0.0169975	0.0070342	0
uf20-0294.cnf	0.0359978	0.0080395	0
uf20-0295.cnf	0.0229981	0.008053	0
uf20-0296.cnf	0.0259988	0.0080388	0
uf20-0297.cnf	0.0099967	0.008027	0
uf20-0298.cnf	0.0059987	0.0060435	0
uf20-0299.cnf	0.0109984	0.0090375	0
uf20-03.cnf	0.0359977	0.0090331	0
uf20-030.cnf	0.0179985	0.0070323	1
uf20-0300.cnf	0.0229964	0.0080519	1
uf20-0301.cnf	0.0219977	0.0080256	1
uf20-0302.cnf	0.0349996	0.007024	0
uf20-0303.cnf	0.0089982	0.0059985	1
uf20-0304.cnf	0.0159978	0.0070257	1
uf20-0305.cnf	0.0129985	0.0080358	0
uf20-0306.cnf	0.0089939	0.0070374	0
uf20-0307.cnf	0.0479986	0.0079987	0
uf20-0308.cnf	0.0279984	0.0059987	0
uf20-0309.cnf	0.0109994	0.0069988	0
uf20-031.cnf	0.0179976	0.0049989	0
uf20-0310.cnf	0.0249989	0.005999	0
uf20-0311.cnf	0.0159984	0.0079987	0
uf20-0312.cnf	0.0149984	0.0059993	0
uf20-0313.cnf	0.0169987	0.0049988	0
uf20-0314.cnf	0.0169973	0.0069984	0
uf20-0315.cnf	0.0169988	0.0149921	0
uf20-0316.cnf	0.0089971	0.0069971	0
uf20-0317.cnf	0.0059984	0.0049985	0
uf20-0318.cnf	0.0119986	0.0069966	1
uf20-0319.cnf	0.0069988	0.0069945	0
uf20-032.cnf	0.0249987	0.0059989	0
uf20-0320.cnf	0.0089983	0.0049992	0
uf20-0321.cnf	0.0139972	0.0079997	1
uf20-0322.cnf	0.0099983	0.0059989	0
uf20-0323.cnf	0.0049976	0.0049981	0
uf20-0324.cnf	0.0149985	0.0059988	0
uf20-0325.cnf	0.0399983	0.0099974	0
uf20-0326.cnf	0.0219983	0.0059987	0
uf20-0327.cnf	0.0099991	0.008999	1
uf20-0328.cnf	0.0199986	0.005999	0
uf20-0329.cnf	0.0259984	0.006998	0
uf20-033.cnf	0.0089991	0.0079992	0

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name	timeDPLL	timeCIDPLL	is_correct
uf20-0330.cnf	0.0179985	0.0079984	0
uf20-0331.cnf	0.0309966	0.0079992	1
uf20-0332.cnf	0.0259986	0.0079988	1
uf20-0333.cnf	0.0239978	0.0069985	0
uf20-0334.cnf	0.0109979	0.0069976	0
uf20-0335.cnf	0.0099995	0.0089988	0
uf20-0336.cnf	0.0139983	0.0079992	0
uf20-0337.cnf	0.0389986	0.0079991	0
uf20-0338.cnf	0.0149956	0.007053	0
uf20-0339.cnf	0.0239982	0.0079992	0
uf20-034.cnf	0.0149983	0.0090007	1
uf20-0340.cnf	0.0130009	0.0080191	0
uf20-0341.cnf	0.0159981	0.0070115	1
uf20-0342.cnf	0.0169985	0.0070351	0
uf20-0343.cnf	0.0169976	0.0070201	0
uf20-0344.cnf	0.0249982	0.0069905	0
uf20-0345.cnf	0.0169983	0.0079643	0
uf20-0346.cnf	0.0239987	0.0069972	0
uf20-0347.cnf	0.0269996	0.0080505	0
uf20-0348.cnf	0.0319976	0.0059988	0
uf20-0349.cnf	0.0099985	0.0079996	0
uf20-035.cnf	0.0179987	0.0060171	0
uf20-0350.cnf	0.0279992	0.0060108	0
uf20-0351.cnf	0.037	0.0090531	0
uf20-0352.cnf	0.0339982	0.00505	0
uf20-0353.cnf	0.0169983	0.0059662	0
uf20-0354.cnf	0.016996	0.0070159	0
uf20-0355.cnf	0.0349981	0.0069984	0
uf20-0356.cnf	0.0279986	0.0080004	0
uf20-0357.cnf	0.0199987	0.0070002	0
uf20-0358.cnf	0.0179984	0.0069896	1
uf20-0359.cnf	0.0069973	0.0079496	0
uf20-036.cnf	0.0119963	0.0070131	0
uf20-0360.cnf	0.0079986	0.0070052	1
uf20-0361.cnf	0.0099984	0.007021	0
uf20-0362.cnf	0.0319981	0.00902	1
uf20-0363.cnf	0.0109993	0.0039987	0
uf20-0364.cnf	0.0209969	0.0049646	0
uf20-0365.cnf	0.0269985	0.0079983	1
uf20-0366.cnf	0.0329982	0.0040506	0
uf20-0367.cnf	0.007	0.0079766	0
uf20-0368.cnf	0.0069982	0.007	0
uf20-0369.cnf	0.0139985	0.0049975	0

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name	timeDPLL	timeCIDPLL	is_correct
uf20-037.cnf	0.0069993	0.0119985	0
uf20-0370.cnf	0.0129985	0.0049988	0
uf20-0371.cnf	0.0079991	0.0079992	1
uf20-0372.cnf	0.0179985	0.0100002	1
uf20-0373.cnf	0.0140007	0.0080009	0
uf20-0374.cnf	0.0139983	0.0099945	0
uf20-0375.cnf	0.0069984	0.0070005	0
uf20-0376.cnf	0.0399986	0.0050337	0
uf20-0377.cnf	0.0099985	0.0080005	1
uf20-0378.cnf	0.0079984	0.0059984	0
uf20-0379.cnf	0.0200001	0.008015	1
uf20-038.cnf	0.004999	0.0089975	1
uf20-0380.cnf	0.0109987	0.0079894	1
uf20-0381.cnf	0.0369983	0.0080129	1
uf20-0382.cnf	0.0079984	0.0050005	0
uf20-0383.cnf	0.0289988	0.0100324	0
uf20-0384.cnf	0.0169988	0.0090501	1
uf20-0385.cnf	0.0219988	0.0069997	0
uf20-0386.cnf	0.0229987	0.0079987	0
uf20-0387.cnf	0.0159979	0.0079977	0
uf20-0388.cnf	0.0359983	0.0089988	1
uf20-0389.cnf	0.0259983	0.0059983	0
uf20-039.cnf	0.009998	0.006998	0
uf20-0390.cnf	0.0089991	0.0069975	0
uf20-0391.cnf	0.0150001	0.0069984	0
uf20-0392.cnf	0.0200007	0.0059991	1
uf20-0393.cnf	0.0229989	0.0069967	0
uf20-0394.cnf	0.0229978	0.0079986	1
uf20-0395.cnf	0.010999	0.0069995	1
uf20-0396.cnf	0.0259988	0.0069989	0
uf20-0397.cnf	0.0059984	0.004999	0
uf20-0398.cnf	0.0169977	0.0059978	0
uf20-0399.cnf	0.0229979	0.0079968	0
uf20-04.cnf	0.0259988	0.0069982	0
uf20-040.cnf	0.0199977	0.0069816	0
uf20-0400.cnf	0.0169979	0.0059986	0
uf20-0401.cnf	0.0079996	0.0069981	1
uf20-0402.cnf	0.0099996	0.0079997	0
uf20-0403.cnf	0.0219986	0.0069997	1
uf20-0404.cnf	0.0119975	0.0079995	0
uf20-0405.cnf	0.0069983	0.0069987	1
uf20-0406.cnf	0.0249988	0.0079991	0
uf20-0407.cnf	0.0139983	0.0089989	0

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name	timeDPLL	timeCIDPLL	is_correct
uf20-0408.cnf	0.0469986	0.0069984	0
uf20-0409.cnf	0.0069995	0.0069981	1
uf20-041.cnf	0.0219982	0.0070005	0
uf20-0410.cnf	0.0109989	0.0059953	0
uf20-0411.cnf	0.0239993	0.0079985	0
uf20-0412.cnf	0.0110003	0.0059961	0
uf20-0413.cnf	0.0249983	0.0079989	0
uf20-0414.cnf	0.0139983	0.0069983	0
uf20-0415.cnf	0.0129985	0.0079988	0
uf20-0416.cnf	0.0109986	0.0069983	0
uf20-0417.cnf	0.0129994	0.0069983	0
uf20-0418.cnf	0.0169978	0.0079983	0
uf20-0419.cnf	0.0219986	0.0079984	0
uf20-042.cnf	0.0339986	0.0069987	0
uf20-0420.cnf	0.009998	0.0049982	0
uf20-0421.cnf	0.0089991	0.0079987	0
uf20-0422.cnf	0.0269988	0.0079995	1
uf20-0423.cnf	0.0239995	0.0079979	0
uf20-0424.cnf	0.0079984	0.007998	0
uf20-0425.cnf	0.0139981	0.007999	0
uf20-0426.cnf	0.0199985	0.0049984	0
uf20-0427.cnf	0.0309983	0.0079988	0
uf20-0428.cnf	0.0239987	0.0079983	0
uf20-0429.cnf	0.0389995	0.0069995	1
uf20-043.cnf	0.019999	0.0059975	0
uf20-0430.cnf	0.0109991	0.0089991	1
uf20-0431.cnf	0.0159984	0.0059971	0
uf20-0432.cnf	0.0119983	0.0059957	0
uf20-0433.cnf	0.0239981	0.0079592	0
uf20-0434.cnf	0.0059989	0.005998	0
uf20-0435.cnf	0.0199986	0.0070307	0
uf20-0436.cnf	0.0089986	0.0070181	0
uf20-0437.cnf	0.0199995	0.0079981	0
uf20-0438.cnf	0.0089975	0.0060021	0
uf20-0439.cnf	0.027999	0.0099944	1
uf20-044.cnf	0.0139988	0.0099956	1
uf20-0440.cnf	0.0119981	0.0050328	0
uf20-0441.cnf	0.0170035	0.0079989	0
uf20-0442.cnf	0.0159992	0.0080319	0
uf20-0443.cnf	0.0249982	0.0080344	0
uf20-0444.cnf	0.0139989	0.0080001	0
uf20-0445.cnf	0.0059985	0.007002	0
uf20-0446.cnf	0.0079988	0.0100291	1

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name	timeDPLL	timeCIDPLL	is_correct
uf20-0447.cnf	0.0309984	0.0070154	0
uf20-0448.cnf	0.0249973	0.0080009	0
uf20-0449.cnf	0.0189983	0.0079986	0
uf20-045.cnf	0.0139976	0.0080319	0
uf20-0450.cnf	0.020004	0.0070334	0
uf20-0451.cnf	0.0099987	0.0099993	1
uf20-0452.cnf	0.0359985	0.0079913	0
uf20-0453.cnf	0.0089979	0.0059993	0
uf20-0454.cnf	0.0259986	0.0089996	0
uf20-0455.cnf	0.0159991	0.0070394	1
uf20-0456.cnf	0.0399993	0.0089952	0
uf20-0457.cnf	0.0480017	0.006987	0
uf20-0458.cnf	0.0290351	0.0059969	0
uf20-0459.cnf	0.0219978	0.0080021	0
uf20-046.cnf	0.0079998	0.0070335	0
uf20-0460.cnf	0.0239984	0.0070007	0
uf20-0461.cnf	0.0329988	0.0069985	0
uf20-0462.cnf	0.0169967	0.0059982	0
uf20-0463.cnf	0.011996	0.0069679	0
uf20-0464.cnf	0.0079984	0.0059988	0
uf20-0465.cnf	0.0079992	0.0100016	0
uf20-0466.cnf	0.032999	0.0059956	0
uf20-0467.cnf	0.0139987	0.0079976	0
uf20-0468.cnf	0.0119983	0.0080345	0
uf20-0469.cnf	0.0079986	0.0079974	0
uf20-047.cnf	0.0139993	0.0069995	0
uf20-0470.cnf	0.0269982	0.0079999	1
uf20-0471.cnf	0.0179985	0.0069999	0
uf20-0472.cnf	0.0169986	0.007	0
uf20-0473.cnf	0.0139986	0.0050271	0
uf20-0474.cnf	0.0249988	0.0070019	0
uf20-0475.cnf	0.0219986	0.0079998	0
uf20-0476.cnf	0.0199981	0.0070159	0
uf20-0477.cnf	0.0239981	0.0059869	0
uf20-0478.cnf	0.0149985	0.0059985	0
uf20-0479.cnf	0.0179956	0.0080004	0
uf20-048.cnf	0.0069978	0.0069991	0
uf20-0480.cnf	0.0339986	0.0080328	0
uf20-0481.cnf	0.0149987	0.0079857	0
uf20-0482.cnf	0.0219986	0.0049631	0
uf20-0483.cnf	0.0079994	0.0080011	1
uf20-0484.cnf	0.0239986	0.0059979	0
uf20-0485.cnf	0.0289987	0.0090183	1

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name	timeDPLL	timeCIDPLL	is_correct
uf20-0486.cnf	0.0109982	0.0089763	1
uf20-0487.cnf	0.0299984	0.0079751	0
uf20-0488.cnf	0.0199979	0.0059996	0
uf20-0489.cnf	0.0199984	0.0080239	0
uf20-049.cnf	0.0090006	0.0080026	0
uf20-0490.cnf	0.0409983	0.0070166	0
uf20-0491.cnf	0.0319996	0.0070048	0
uf20-0492.cnf	0.0139978	0.0100182	1
uf20-0493.cnf	0.025998	0.0070125	0
uf20-0494.cnf	0.0079986	0.006032	0
uf20-0495.cnf	0.0339992	0.0080391	0
uf20-0496.cnf	0.0179981	0.0059988	1
uf20-0497.cnf	0.0139988	0.0080489	1
uf20-0498.cnf	0.0309985	0.0059667	0
uf20-0499.cnf	0.0099975	0.0039664	0
uf20-05.cnf	0.0079979	0.0070378	1
uf20-050.cnf	0.0089984	0.0060134	0
uf20-0500.cnf	0.0199984	0.0089822	0
uf20-0501.cnf	0.0189977	0.0079992	1
uf20-0502.cnf	0.0140016	0.0060336	1
uf20-0503.cnf	0.0069985	0.0069969	1
uf20-0504.cnf	0.0340018	0.0080152	0
uf20-0505.cnf	0.0249987	0.0070347	0
uf20-0506.cnf	0.0269811	0.0059973	1
uf20-0507.cnf	0.0260419	0.0089406	1
uf20-0508.cnf	0.0149972	0.0089998	1
uf20-0509.cnf	0.0360351	0.0079606	0
uf20-051.cnf	0.0360015	0.0080265	0
uf20-0510.cnf	0.0170051	0.0090008	1
uf20-0511.cnf	0.0139877	0.0069918	0
uf20-0512.cnf	0.0179989	0.0059989	0
uf20-0513.cnf	0.0099979	0.0079837	0
uf20-0514.cnf	0.0200006	0.0079977	0
uf20-0515.cnf	0.034001	0.0080173	0
uf20-0516.cnf	0.0229967	0.0059909	0
uf20-0517.cnf	0.0379996	0.0069634	0
uf20-0518.cnf	0.0410339	0.0070011	0
uf20-0519.cnf	0.0259648	0.0080347	0
uf20-052.cnf	0.0139496	0.0059952	0
uf20-0520.cnf	0.0210338	0.0069867	0
uf20-0521.cnf	0.0199639	0.0059519	0
uf20-0522.cnf	0.0100301	0.0060348	0
uf20-0523.cnf	0.0259594	0.0079643	0

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name	timeDPLL	timeCIDPLL	is_correct
uf20-0524.cnf	0.0280301	0.0090323	0
uf20-0525.cnf	0.0350003	0.0069991	0
uf20-0526.cnf	0.0180057	0.006034	0
uf20-0527.cnf	0.0269561	0.0080091	0
uf20-0528.cnf	0.0229998	0.0090344	0
uf20-0529.cnf	0.029996	0.0060472	0
uf20-053.cnf	0.0389751	0.008019	1
uf20-0530.cnf	0.0119895	0.0069907	1
uf20-0531.cnf	0.0270078	0.0080021	1
uf20-0532.cnf	0.0580061	0.0080146	0
uf20-0533.cnf	0.0129891	0.0060195	0
uf20-0534.cnf	0.013003	0.009014	0
uf20-0535.cnf	0.0090204	0.0090041	1
uf20-0536.cnf	0.0140128	0.0080339	0
uf20-0537.cnf	0.0089947	0.0090493	0
uf20-0538.cnf	0.0580072	0.0080156	0
uf20-0539.cnf	0.0129646	0.0070029	1
uf20-054.cnf	0.0179986	0.0050015	0
uf20-0540.cnf	0.008033	0.0079999	1
uf20-0541.cnf	0.0129748	0.0089976	0
uf20-0542.cnf	0.0269938	0.006996	0
uf20-0543.cnf	0.0290017	0.0070135	0
uf20-0544.cnf	0.0090156	0.0079446	0
uf20-0545.cnf	0.019035	0.0049976	1
uf20-0546.cnf	0.0259837	0.0070596	0
uf20-0547.cnf	0.0270235	0.0090072	0
uf20-0548.cnf	0.0160356	0.0070082	0
uf20-0549.cnf	0.0240155	0.006014	0
uf20-055.cnf	0.0220351	0.0070405	0
uf20-0550.cnf	0.0290011	0.0080024	0
uf20-0551.cnf	0.0120404	0.0060016	0
uf20-0552.cnf	0.0169966	0.0079658	0
uf20-0553.cnf	0.0089244	0.0060062	0
uf20-0554.cnf	0.0060241	0.0040442	0
uf20-0555.cnf	0.0199971	0.0089641	0
uf20-0556.cnf	0.0180092	0.0060229	0
uf20-0557.cnf	0.0219615	0.0100172	0
uf20-0558.cnf	0.0100005	0.0110146	0
uf20-0559.cnf	0.0090335	0.0069824	1
uf20-056.cnf	0.0110333	0.0090486	1
uf20-0560.cnf	0.0270355	0.0059996	0
uf20-0561.cnf	0.0199971	0.0040339	0
uf20-0562.cnf	0.0220338	0.0089964	0

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name	timeDPLL	timeCIDPLL	is_correct
uf20-0563.cnf	0.0250074	0.0080354	1
uf20-0564.cnf	0.0240299	0.0049851	0
uf20-0565.cnf	0.0100396	0.0090142	1
uf20-0566.cnf	0.0100345	0.0079636	0
uf20-0567.cnf	0.0390294	0.0060343	0
uf20-0568.cnf	0.015995	0.0070182	1
uf20-0569.cnf	0.0160009	0.010966	1
uf20-057.cnf	0.0110114	0.0060375	0
uf20-0570.cnf	0.0089967	0.007023	0
uf20-0571.cnf	0.0179829	0.008017	0
uf20-0572.cnf	0.0270528	0.0060223	0
uf20-0573.cnf	0.0099953	0.0069986	0
uf20-0574.cnf	0.0360367	0.0070362	0
uf20-0575.cnf	0.0180007	0.0060495	0
uf20-0576.cnf	0.0230361	0.0070342	1
uf20-0577.cnf	0.0080301	0.0099969	1
uf20-0578.cnf	0.0069747	0.0080305	0
uf20-0579.cnf	0.044963	0.0080354	0
uf20-058.cnf	0.0399846	0.0069989	0
uf20-0580.cnf	0.028	0.0050017	0
uf20-0581.cnf	0.0360045	0.0080177	0
uf20-0582.cnf	0.0079974	0.0060337	0
uf20-0583.cnf	0.0350361	0.0060459	0
uf20-0584.cnf	0.0470003	0.0070211	0
uf20-0585.cnf	0.0369958	0.0070017	0
uf20-0586.cnf	0.0119985	0.0060429	0
uf20-0587.cnf	0.0199996	0.0080092	0
uf20-0588.cnf	0.0270018	0.0069976	1
uf20-0589.cnf	0.0290194	0.0060273	0
uf20-059.cnf	0.039969	0.0080366	0
uf20-0590.cnf	0.0390273	0.0080392	0
uf20-0591.cnf	0.0319968	0.0080483	0
uf20-0592.cnf	0.0120378	0.0070225	0
uf20-0593.cnf	0.0150009	0.0070395	0
uf20-0594.cnf	0.0220315	0.006018	0
uf20-0595.cnf	0.0070344	0.0139863	0
uf20-0596.cnf	0.0130329	0.0070308	0
uf20-0597.cnf	0.0410072	0.0060292	0
uf20-0598.cnf	0.0250329	0.0060097	0
uf20-0599.cnf	0.0139988	0.0040011	0
uf20-06.cnf	0.0290453	0.0070524	0
uf20-060.cnf	0.0320004	0.0060378	0
uf20-0600.cnf	0.0320002	0.0070237	0

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name	timeDPLL	timeCIDPLL	is_correct
uf20-0601.cnf	0.0300052	0.0060248	0
uf20-0602.cnf	0.0090194	0.0060529	0
uf20-0603.cnf	0.0110353	0.008036	0
uf20-0604.cnf	0.0060228	0.0079999	1
uf20-0605.cnf	0.0080253	0.0070354	1
uf20-0606.cnf	0.0220072	0.0070443	0
uf20-0607.cnf	0.0310355	0.0070282	0
uf20-0608.cnf	0.0349967	0.0080411	0
uf20-0609.cnf	0.0210367	0.0070331	0
uf20-061.cnf	0.016034	0.0070405	1
uf20-0610.cnf	0.0260275	0.0080504	0
uf20-0611.cnf	0.0180006	0.0050257	0
uf20-0612.cnf	0.0220372	0.0070356	0
uf20-0613.cnf	0.0210617	0.0070233	0
uf20-0614.cnf	0.0210109	0.0080018	1
uf20-0615.cnf	0.0189983	0.0070505	0
uf20-0616.cnf	0.0250531	0.0050377	0
uf20-0617.cnf	0.0290375	0.0070352	1
uf20-0618.cnf	0.0330106	0.0090371	0
uf20-0619.cnf	0.023992	0.0080341	1
uf20-062.cnf	0.0169991	0.009024	0
uf20-0620.cnf	0.0200028	0.0089979	0
uf20-0621.cnf	0.0539985	0.0060453	0
uf20-0622.cnf	0.0230016	0.0080525	0
uf20-0623.cnf	0.0509975	0.0080346	0
uf20-0624.cnf	0.0189984	0.0070344	0
uf20-0625.cnf	0.0679995	0.0090364	0
uf20-0626.cnf	0.0540036	0.0070354	0
uf20-0627.cnf	0.016998	0.0060387	0
uf20-0628.cnf	0.030995	0.0070279	0
uf20-0629.cnf	0.076995	0.0070514	0
uf20-063.cnf	0.0189988	0.0070262	0
uf20-0630.cnf	0.0139961	0.0080379	0
uf20-0631.cnf	0.0389975	0.0070044	0
uf20-0632.cnf	0.0199935	0.0089687	0
uf20-0633.cnf	0.0079709	0.0059996	0
uf20-0634.cnf	0.0089984	0.0090073	1
uf20-0635.cnf	0.0249982	0.0070117	0
uf20-0636.cnf	0.0208705	0.0080308	0
uf20-0637.cnf	0.0170355	0.0070357	0
uf20-0638.cnf	0.0260305	0.0080145	0
uf20-0639.cnf	0.0259985	0.0090482	0
uf20-064.cnf	0.0239987	0.0060538	1

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name	timeDPLL	timeCIDPLL	is_correct
uf20-0640.cnf	0.0109986	0.009038	1
uf20-0641.cnf	0.0439996	0.0100011	0
uf20-0642.cnf	0.0089987	0.0089585	1
uf20-0643.cnf	0.0219978	0.0070373	1
uf20-0644.cnf	0.024999	0.0090086	0
uf20-0645.cnf	0.0159986	0.0070183	1
uf20-0646.cnf	0.0259966	0.0050361	0
uf20-0647.cnf	0.0129985	0.0070384	0
uf20-0648.cnf	0.0069994	0.0070389	1
uf20-0649.cnf	0.0109985	0.0100027	0
uf20-065.cnf	0.0099989	0.0049984	0
uf20-0650.cnf	0.0089987	0.0070522	1
uf20-0651.cnf	0.0219987	0.0050016	0
uf20-0652.cnf	0.0169987	0.0060362	0
uf20-0653.cnf	0.0099977	0.0080001	0
uf20-0654.cnf	0.0179989	0.0060351	0
uf20-0655.cnf	0.0079997	0.0080346	0
uf20-0656.cnf	0.0189963	0.0090005	0
uf20-0657.cnf	0.0119984	0.0080013	1
uf20-0658.cnf	0.0289986	0.0080355	0
uf20-0659.cnf	0.0079983	0.0060396	1
uf20-066.cnf	0.0059992	0.0090417	0
uf20-0660.cnf	0.0189983	0.0070069	0
uf20-0661.cnf	0.0289966	0.0070366	0
uf20-0662.cnf	0.0139984	0.008054	0
uf20-0663.cnf	0.0069983	0.0069674	0
uf20-0664.cnf	0.0289988	0.0059944	0
uf20-0665.cnf	0.0079993	0.0070297	0
uf20-0666.cnf	0.016999	0.0050345	0
uf20-0667.cnf	0.0149987	0.0050356	0
uf20-0668.cnf	0.0209986	0.0059984	0
uf20-0669.cnf	0.0219983	0.0060362	0
uf20-067.cnf	0.0069976	0.0050296	0
uf20-0670.cnf	0.0309977	0.0070003	0
uf20-0671.cnf	0.0069986	0.0070272	0
uf20-0672.cnf	0.0079988	0.0059992	0
uf20-0673.cnf	0.0089987	0.006037	0
uf20-0674.cnf	0.0089984	0.0070372	0
uf20-0675.cnf	0.0279986	0.0070387	0
uf20-0676.cnf	0.0109958	0.0080453	0
uf20-0677.cnf	0.0219981	0.0080386	0
uf20-0678.cnf	0.0129991	0.0090534	0
uf20-0679.cnf	0.0079988	0.0080491	0

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name	timeDPLL	timeCIDPLL	is_correct
uf20-068.cnf	0.0359987	0.0070414	0
uf20-0680.cnf	0.0129985	0.0070354	0
uf20-0681.cnf	0.0170019	0.0080426	1
uf20-0682.cnf	0.0179995	0.007998	1
uf20-0683.cnf	0.0430003	0.0060242	0
uf20-0684.cnf	0.0409808	0.0070245	0
uf20-0685.cnf	0.0209984	0.0079926	0
uf20-0686.cnf	0.0129985	0.0130038	1
uf20-0687.cnf	0.0240006	0.0070452	0
uf20-0688.cnf	0.0309982	0.0080252	0
uf20-0689.cnf	0.0069986	0.008043	0
uf20-069.cnf	0.0279987	0.0060357	0
uf20-0690.cnf	0.0109983	0.00604	0
uf20-0691.cnf	0.021999	0.0080428	0
uf20-0692.cnf	0.0269981	0.011034	0
uf20-0693.cnf	0.0249993	0.0070412	0
uf20-0694.cnf	0.0279978	0.0069823	0
uf20-0695.cnf	0.0299978	0.0070002	0
uf20-0696.cnf	0.033002	0.0080159	0
uf20-0697.cnf	0.0229971	0.005989	1
uf20-0698.cnf	0.0279985	0.0070264	0
uf20-0699.cnf	0.0189986	0.0090337	1
uf20-07.cnf	0.0119952	0.008035	0
uf20-070.cnf	0.0109996	0.0070349	0
uf20-0700.cnf	0.0329991	0.0070262	0
uf20-0701.cnf	0.0329989	0.007037	0
uf20-0702.cnf	0.0249989	0.0060233	1
uf20-0703.cnf	0.0079985	0.0080469	1
uf20-0704.cnf	0.0139987	0.0070261	0
uf20-0705.cnf	0.0519984	0.0090523	0
uf20-0706.cnf	0.0069991	0.0070392	0
uf20-0707.cnf	0.0369986	0.0080409	0
uf20-0708.cnf	0.034999	0.0050317	0
uf20-0709.cnf	0.0079977	0.0050246	1
uf20-071.cnf	0.0149993	0.0060354	0
uf20-0710.cnf	0.0149984	0.0059991	0
uf20-0711.cnf	0.028996	0.0060275	0
uf20-0712.cnf	0.043999	0.0060526	0
uf20-0713.cnf	0.022997	0.0070284	0
uf20-0714.cnf	0.0299988	0.0070403	1
uf20-0715.cnf	0.0429981	0.0080272	0
uf20-0716.cnf	0.0249942	0.0080444	0
uf20-0717.cnf	0.0249981	0.0080247	0

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name	timeDPLL	timeCIDPLL	is_correct
uf20-0718.cnf	0.0099985	0.0090255	0
uf20-0719.cnf	0.0129981	0.0050432	0
uf20-072.cnf	0.0139986	0.0080273	0
uf20-0720.cnf	0.0259987	0.0070358	0
uf20-0721.cnf	0.0079968	0.0060092	1
uf20-0722.cnf	0.0429988	0.0070375	1
uf20-0723.cnf	0.0109987	0.0060351	0
uf20-0724.cnf	0.0109973	0.0069982	0
uf20-0725.cnf	0.0179984	0.0069984	0
uf20-0726.cnf	0.0079986	0.006998	0
uf20-0727.cnf	0.0499914	0.0079985	0
uf20-0728.cnf	0.0089916	0.0059963	0
uf20-0729.cnf	0.0150542	0.006999	0
uf20-073.cnf	0.0210437	0.005999	0
uf20-0730.cnf	0.0349993	0.0079991	1
uf20-0731.cnf	0.0120153	0.0059989	0
uf20-0732.cnf	0.0250001	0.0059989	0
uf20-0733.cnf	0.0130171	0.0079988	1
uf20-0734.cnf	0.0339619	0.0079829	0
uf20-0735.cnf	0.0080353	0.0069978	0
uf20-0736.cnf	0.0200007	0.006998	0
uf20-0737.cnf	0.0230381	0.0079984	0
uf20-0738.cnf	0.0080387	0.0079982	0
uf20-0739.cnf	0.0320369	0.0079989	1
uf20-074.cnf	0.0370372	0.0059987	0
uf20-0740.cnf	0.0120424	0.0069966	0
uf20-0741.cnf	0.012031	0.0099986	0
uf20-0742.cnf	0.0300255	0.0059985	1
uf20-0743.cnf	0.0160384	0.0079985	0
uf20-0744.cnf	0.0240215	0.0069989	0
uf20-0745.cnf	0.0230041	0.0079985	0
uf20-0746.cnf	0.0270092	0.0069983	1
uf20-0747.cnf	0.0640533	0.0079995	0
uf20-0748.cnf	0.0099674	0.0089987	1
uf20-0749.cnf	0.0110313	0.007999	1
uf20-075.cnf	0.0280142	0.0079988	0
uf20-0750.cnf	0.0260363	0.0049991	0
uf20-0751.cnf	0.0200579	0.0079948	0
uf20-0752.cnf	0.0169989	0.0079992	0
uf20-0753.cnf	0.0160097	0.0069933	0
uf20-0754.cnf	0.0140039	0.0069984	0
uf20-0755.cnf	0.0219966	0.0099982	0
uf20-0756.cnf	0.0309984	0.0079992	1

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name	timeDPLL	timeCIDPLL	is_correct
uf20-0757.cnf	0.0110048	0.0069973	0
uf20-0758.cnf	0.0140356	0.0069978	0
uf20-0759.cnf	0.0129988	0.0070008	0
uf20-076.cnf	0.0300094	0.0079993	0
uf20-0760.cnf	0.0340389	0.0079991	1
uf20-0761.cnf	0.017035	0.0089979	0
uf20-0762.cnf	0.0150353	0.0059987	0
uf20-0763.cnf	0.0280338	0.0079988	0
uf20-0764.cnf	0.0390012	0.0079974	0
uf20-0765.cnf	0.006996	0.006999	0
uf20-0766.cnf	0.009041	0.007999	1
uf20-0767.cnf	0.0130368	0.0069961	0
uf20-0768.cnf	0.012037	0.0089996	1
uf20-0769.cnf	0.0120159	0.0059994	0
uf20-077.cnf	0.0140541	0.0099986	1
uf20-0770.cnf	0.0399968	0.0090005	1
uf20-0771.cnf	0.0280017	0.0070744	0
uf20-0772.cnf	0.0330075	0.0089981	1
uf20-0773.cnf	0.0129952	0.0079993	1
uf20-0774.cnf	0.0210156	0.0089985	0
uf20-0775.cnf	0.0190366	0.0079988	0
uf20-0776.cnf	0.0140364	0.006999	0
uf20-0777.cnf	0.0199998	0.0049996	0
uf20-0778.cnf	0.0130013	0.0079985	0
uf20-0779.cnf	0.013044	0.0089983	0
uf20-078.cnf	0.0260362	0.0049995	0
uf20-0780.cnf	0.0290441	0.0089984	0
uf20-0781.cnf	0.0080315	0.0069965	1
uf20-0782.cnf	0.0350255	0.0069997	0
uf20-0783.cnf	0.0449985	0.0089987	0
uf20-0784.cnf	0.0099889	0.0079984	0
uf20-0785.cnf	0.0120251	0.0079986	0
uf20-0786.cnf	0.0120337	0.0069989	0
uf20-0787.cnf	0.0100415	0.0079986	0
uf20-0788.cnf	0.0080545	0.0069989	0
uf20-0789.cnf	0.0289716	0.0069988	0
uf20-079.cnf	0.0119959	0.0079988	1
uf20-0790.cnf	0.0190343	0.0069984	0
uf20-0791.cnf	0.0660529	0.0079962	0
uf20-0792.cnf	0.0120427	0.0059984	0
uf20-0793.cnf	0.0160342	0.0069988	0
uf20-0794.cnf	0.0070335	0.0059983	0
uf20-0795.cnf	0.0110352	0.0070009	1

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name	timeDPLL	timeCIDPLL	is_correct
uf20-0796.cnf	0.0280372	0.0059992	0
uf20-0797.cnf	0.0100283	0.0069988	0
uf20-0798.cnf	0.0090456	0.0070478	1
uf20-0799.cnf	0.008002	0.0079537	0
uf20-08.cnf	0.0119985	0.0080086	0
uf20-080.cnf	0.0110353	0.0080248	1
uf20-0800.cnf	0.029043	0.007997	0
uf20-0801.cnf	0.0250492	0.0060545	0
uf20-0802.cnf	0.0179948	0.0079995	1
uf20-0803.cnf	0.0080004	0.0070376	1
uf20-0804.cnf	0.0070347	0.006015	1
uf20-0805.cnf	0.022035	0.0070075	1
uf20-0806.cnf	0.0140362	0.0079874	0
uf20-0807.cnf	0.0140361	0.0069988	0
uf20-0808.cnf	0.0110533	0.0049664	0
uf20-0809.cnf	0.024015	0.0069973	0
uf20-081.cnf	0.011037	0.0079782	0
uf20-0810.cnf	0.0130325	0.0069858	0
uf20-0811.cnf	0.0100242	0.0079986	0
uf20-0812.cnf	0.0230523	0.0069979	0
uf20-0813.cnf	0.0079901	0.0080165	0
uf20-0814.cnf	0.0110244	0.008984	1
uf20-0815.cnf	0.0060445	0.0059589	0
uf20-0816.cnf	0.0190345	0.0050383	0
uf20-0817.cnf	0.0080352	0.0090316	0
uf20-0818.cnf	0.019019	0.0079908	0
uf20-0819.cnf	0.0310006	0.0069944	1
uf20-082.cnf	0.0230238	0.0080182	0
uf20-0820.cnf	0.0289991	0.0080015	0
uf20-0821.cnf	0.0120383	0.0060001	0
uf20-0822.cnf	0.0280352	0.0050168	0
uf20-0823.cnf	0.024035	0.0090097	0
uf20-0824.cnf	0.0180074	0.0099983	1
uf20-0825.cnf	0.0120347	0.0060538	0
uf20-0826.cnf	0.0109744	0.0080005	1
uf20-0827.cnf	0.0550351	0.007021	0
uf20-0828.cnf	0.0169944	0.0090143	1
uf20-0829.cnf	0.0190371	0.0049953	0
uf20-083.cnf	0.0160346	0.0049954	0
uf20-0830.cnf	0.0120107	0.0070003	0
uf20-0831.cnf	0.036036	0.009	0
uf20-0832.cnf	0.0120238	0.0089984	0
uf20-0833.cnf	0.0090362	0.009016	0

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name	timeDPLL	timeCIDPLL	is_correct
uf20-0834.cnf	0.0140348	0.0070349	0
uf20-0835.cnf	0.0130036	0.0079988	0
uf20-0836.cnf	0.0219962	0.00697	0
uf20-0837.cnf	0.0340348	0.0059973	0
uf20-0838.cnf	0.0200536	0.0079963	1
uf20-0839.cnf	0.0270018	0.0079836	0
uf20-084.cnf	0.0249958	0.0099979	0
uf20-0840.cnf	0.0320332	0.0069975	0
uf20-0841.cnf	0.0230348	0.007006	0
uf20-0842.cnf	0.0160357	0.0069995	0
uf20-0843.cnf	0.0070374	0.0079669	0
uf20-0844.cnf	0.024036	0.0070239	1
uf20-0845.cnf	0.0160001	0.00705	0
uf20-0846.cnf	0.021014	0.0080317	0
uf20-0847.cnf	0.0079997	0.0079983	0
uf20-0848.cnf	0.0300561	0.0069963	0
uf20-0849.cnf	0.0360361	0.0070313	0
uf20-085.cnf	0.0589859	0.0080336	0
uf20-0850.cnf	0.0090406	0.0089919	0
uf20-0851.cnf	0.0260354	0.0069992	0
uf20-0852.cnf	0.0350354	0.0050144	0
uf20-0853.cnf	0.015011	0.0070162	0
uf20-0854.cnf	0.0090368	0.0070003	0
uf20-0855.cnf	0.0320346	0.0070036	0
uf20-0856.cnf	0.0079975	0.0075105	0
uf20-0857.cnf	0.0130341	0.0040073	0
uf20-0858.cnf	0.0380351	0.0080079	0
uf20-0859.cnf	0.0390859	0.0069611	1
uf20-086.cnf	0.0140345	0.0089834	1
uf20-0860.cnf	0.0130347	0.0080804	0
uf20-0861.cnf	0.0080184	0.0079666	0
uf20-0862.cnf	0.0219646	0.0069707	0
uf20-0863.cnf	0.0190378	0.0069981	0
uf20-0864.cnf	0.0060216	0.0060035	0
uf20-0865.cnf	0.0240595	0.006999	0
uf20-0866.cnf	0.0140034	0.0060146	0
uf20-0867.cnf	0.0200357	0.0049947	0
uf20-0868.cnf	0.0090269	0.0080061	1
uf20-0869.cnf	0.0210026	0.0079983	1
uf20-087.cnf	0.0360026	0.0070159	0
uf20-0870.cnf	0.023037	0.0050321	0
uf20-0871.cnf	0.0070014	0.006052	1
uf20-0872.cnf	0.0120324	0.0070081	1

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name	timeDPLL	timeCIDPLL	is_correct
uf20-0873.cnf	0.0190928	0.0070107	0
uf20-0874.cnf	0.0160417	0.0079814	0
uf20-0875.cnf	0.0199957	0.0070243	0
uf20-0876.cnf	0.0440403	0.0080345	0
uf20-0877.cnf	0.0280356	0.0069649	0
uf20-0878.cnf	0.0100265	0.0089699	0
uf20-0879.cnf	0.0120244	0.0060356	0
uf20-088.cnf	0.0140371	0.0099939	1
uf20-0880.cnf	0.009036	0.0050253	0
uf20-0881.cnf	0.0300101	0.0069909	0
uf20-0882.cnf	0.029046	0.0065433	0
uf20-0883.cnf	0.0210324	0.0079747	0
uf20-0884.cnf	0.0210359	0.004995	0
uf20-0885.cnf	0.0150405	0.0071371	0
uf20-0886.cnf	0.0270001	0.0080044	1
uf20-0887.cnf	0.0190002	0.0069994	0
uf20-0888.cnf	0.0280978	0.0090003	0
uf20-0889.cnf	0.0080368	0.0059986	0
uf20-089.cnf	0.010037	0.0060105	0
uf20-0890.cnf	0.0160354	0.0070036	0
uf20-0891.cnf	0.0279728	0.0070671	0
uf20-0892.cnf	0.0120201	0.0069977	0
uf20-0893.cnf	0.0160384	0.0060347	0
uf20-0894.cnf	0.029038	0.0069972	0
uf20-0895.cnf	0.009036	0.0090186	1
uf20-0896.cnf	0.0200371	0.0061106	0
uf20-0897.cnf	0.025033	0.0089947	1
uf20-0898.cnf	0.0130365	0.0080072	1
uf20-0899.cnf	0.033002	0.0070121	0
uf20-09.cnf	0.0160098	0.0069904	0
uf20-090.cnf	0.027036	0.0079933	0
uf20-0900.cnf	0.0100533	0.007019	0
uf20-0901.cnf	0.0330345	0.0060048	0
uf20-0902.cnf	0.0120427	0.0089941	0
uf20-0903.cnf	0.0300362	0.0060011	0
uf20-0904.cnf	0.0370407	0.0060547	0
uf20-0905.cnf	0.0070337	0.007001	0
uf20-0906.cnf	0.0230525	0.0080039	0
uf20-0907.cnf	0.0100251	0.0079993	0
uf20-0908.cnf	0.0290328	0.0050451	0
uf20-0909.cnf	0.0380362	0.0090028	1
uf20-091.cnf	0.0220334	0.0079703	0
uf20-0910.cnf	0.0200345	0.0090512	0

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name	timeDPLL	timeCIDPLL	is_correct
uf20-0911.cnf	0.0120367	0.0079995	0
uf20-0912.cnf	0.007035	0.0060027	0
uf20-0913.cnf	0.0200371	0.0069927	0
uf20-0914.cnf	0.0360362	0.0090106	0
uf20-0915.cnf	0.0110367	0.0080107	0
uf20-0916.cnf	0.031048	0.0080099	1
uf20-0917.cnf	0.0160381	0.0069679	1
uf20-0918.cnf	0.0160393	0.0060174	0
uf20-0919.cnf	0.0090515	0.0059991	0
uf20-092.cnf	0.0240365	0.0070031	0
uf20-0920.cnf	0.0180392	0.0069824	1
uf20-0921.cnf	0.0129996	0.0080118	0
uf20-0922.cnf	0.006986	0.0079985	0
uf20-0923.cnf	0.04004	0.0070017	0
uf20-0924.cnf	0.0300328	0.0060009	0
uf20-0925.cnf	0.02	0.0089993	0
uf20-0926.cnf	0.0059986	0.0070387	0
uf20-0927.cnf	0.0290343	0.0070018	0
uf20-0928.cnf	0.0120311	0.005039	0
uf20-0929.cnf	0.0250022	0.0080145	0
uf20-093.cnf	0.0100349	0.0060068	0
uf20-0930.cnf	0.0220344	0.0070007	0
uf20-0931.cnf	0.0090383	0.0059989	0
uf20-0932.cnf	0.0100001	0.0090087	1
uf20-0933.cnf	0.0209989	0.0050249	0
uf20-0934.cnf	0.0100435	0.0050264	0
uf20-0935.cnf	0.0170376	0.0060249	0
uf20-0936.cnf	0.0309664	0.0079768	0
uf20-0937.cnf	0.0130372	0.0070383	0
uf20-0938.cnf	0.0380363	0.0070054	0
uf20-0939.cnf	0.0119985	0.0080498	1
uf20-094.cnf	0.0390154	0.0070106	0
uf20-0940.cnf	0.0310374	0.0100022	0
uf20-0941.cnf	0.0129932	0.0090007	1
uf20-0942.cnf	0.0100445	0.0070257	1
uf20-0943.cnf	0.0409732	0.0060244	0
uf20-0944.cnf	0.0100114	0.008035	0
uf20-0945.cnf	0.010037	0.0069985	0
uf20-0946.cnf	0.0220341	0.0069947	0
uf20-0947.cnf	0.0069956	0.0089965	1
uf20-0948.cnf	0.0170355	0.0049992	0
uf20-0949.cnf	0.0100264	0.0060105	0
uf20-095.cnf	0.0370362	0.0059978	0

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name	timeDPLL	timeCIDPLL	is_correct
uf20-0950.cnf	0.0089989	0.0040026	0
uf20-0951.cnf	0.008999	0.0080362	1
uf20-0952.cnf	0.0219885	0.0080354	0
uf20-0953.cnf	0.0150361	0.0090005	0
uf20-0954.cnf	0.0130362	0.0059993	0
uf20-0955.cnf	0.0100519	0.0079981	0
uf20-0956.cnf	0.0140366	0.0049891	0
uf20-0957.cnf	0.0199932	0.0090001	0
uf20-0958.cnf	0.0090027	0.0059987	0
uf20-0959.cnf	0.0100364	0.0050003	0
uf20-096.cnf	0.0100347	0.0070347	0
uf20-0960.cnf	0.0090522	0.0060259	0
uf20-0961.cnf	0.0280352	0.0100379	1
uf20-0962.cnf	0.0069871	0.0079996	0
uf20-0963.cnf	0.0299456	0.0070006	0
uf20-0964.cnf	0.0220382	0.01	1
uf20-0965.cnf	0.0419665	0.009	1
uf20-0966.cnf	0.0310031	0.0070001	0
uf20-0967.cnf	0.0250383	0.0059931	1
uf20-0968.cnf	0.0070357	0.0059995	0
uf20-0969.cnf	0.0080236	0.0089977	1
uf20-097.cnf	0.0120347	0.0079986	0
uf20-0970.cnf	0.0180068	0.0059922	0
uf20-0971.cnf	0.0149991	0.0070359	0
uf20-0972.cnf	0.0069966	0.0060353	0
uf20-0973.cnf	0.0259983	0.0079964	0
uf20-0974.cnf	0.023998	0.0060251	0
uf20-0975.cnf	0.0339975	0.006999	0
uf20-0976.cnf	0.0089964	0.005999	0
uf20-0977.cnf	0.0219985	0.0080016	0
uf20-0978.cnf	0.0229992	0.0079989	0
uf20-0979.cnf	0.0049971	0.0070269	0
uf20-098.cnf	0.0139983	0.0070313	0
uf20-0980.cnf	0.0149986	0.0080345	1
uf20-0981.cnf	0.0059988	0.0080343	0
uf20-0982.cnf	0.0139986	0.0090276	0
uf20-0983.cnf	0.0099975	0.0060286	0
uf20-0984.cnf	0.0149984	0.0060407	0
uf20-0985.cnf	0.0339985	0.0070513	0
uf20-0986.cnf	0.0319973	0.0070359	0
uf20-0987.cnf	0.0089986	0.0080275	1
uf20-0988.cnf	0.0389988	0.0090526	0
uf20-0989.cnf	0.0289961	0.0080264	0

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name	timeDPLL	timeCIDPLL	is_correct
uf20-099.cnf	0.0119984	0.0060042	0
uf20-0990.cnf	0.0449581	0.0070428	0
uf20-0991.cnf	0.0070261	0.0080345	0
uf20-0992.cnf	0.022029	0.0080489	0
uf20-0993.cnf	0.0210103	0.008037	0
uf20-0994.cnf	0.0170397	0.0090378	1
uf20-0995.cnf	0.0459995	0.0080369	0
uf20-0996.cnf	0.0260032	0.0090341	1
uf20-0997.cnf	0.0190346	0.007035	0
uf20-0998.cnf	0.0230358	0.0080361	0
uf20-0999.cnf	0.0070012	0.0090281	1

7. Result discussion

As expected DPLL performed slower than CIDPLL, taking on average 2.96 longer to complete. Other than that, the algorithm worked as expected and the return time was satisfactory.

8. Conclusion

In this work, we present the DPLL algorithm, together with an analysis of the state-of-the-art algorithms to solve the SAT problem and a comparison with the CIDPLL heuristic we developed in a previous work.

Initially, we choose DPLL out of simplicity, without expecting it to be on par with modern techniques, but were surprised to learn that current SAT solvers don't stray so far from DPLL and focus more on optimization rather than radically new ideas.

With respect to the comparison with CIDPLL, it went according to our expectations, seen DPLL was slower.

For our future works, we plan to implement a meta heuristic for the SAT problem, as a continuation of the assignments proposed by the Algorithms Analysis and Projects discipline.

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