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Australian Informatics Olympiad  
Thursday 3 September, 2009

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Information Booklet

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Running the Contest

Contest Rules

Why Did I Score Zero?

Please read this booklet before  
the day of the contest

# Running the Contest

**Please read through this information carefully.** If you have any questions, you are encouraged to e-mail the judges at [aioquery@amt.edu.au](mailto:aioquery@amt.edu.au). We will endeavour to answer any queries as soon as possible.

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## Submission Website

The contest will be run through the submission website: <http://orac.amt.edu.au/aio/>

## Before the Contest

- Please ensure that students and teachers are familiar with the contest rules. Note that students may not see the actual contest questions until the beginning of the four hour contest period.
- **Teachers will need to register their schools beforehand.** We advise you to do this at least a day before the contest. You can register your school through the submission website.
  - During registration, we will ask for contact details for the supervising teacher. This will allow us to contact you if anything goes wrong.
  - We will also ask for contact details for each student. This will allow us to contact the student in the event that they perform very well and are invited to the December School of Excellence.
  - Upon registering your school, you will receive a username and password for each student. This will allow students to submit their own solutions during the contest.

## Starting the Contest

- Teachers should give each student their question booklet, along with the student's username and password from registration.
- To start the contest, **the teacher must log into the submission website and start the contest timer.** At this point they may advise students to open their question booklets and begin working.

## During the Contest

- Students may log into the submission website using the username and password given to them by their teacher.
- Students should submit their solutions through this website **during the four hour contest period.** You may submit as many times as you like, however:
- **Only the last submission for each question will be judged.** Each time you resubmit a solution for the same question, your previous solution will be lost.
- **You may not make any submissions once your four hours are over!** Please do not leave all your submissions until the last few minutes—otherwise you risk running out of time. Students are advised to submit each solution once it is written (remember, you may always resubmit a better solution later).
- The solution for each problem should be a single computer program.

- When submitting solutions, students should submit the actual source code (such as *file.c*), not the compiled executable (such as *file.exe*). **Compiled executables will not be marked, and will receive a score of zero.**
- If students are unable to submit solutions for whatever reason, teachers will be able to use their teacher username and password to submit solutions on their behalf.
- If students have any queries regarding the contest questions, the judges may be contacted at *aioquery@amt.edu.au*. Note that queries must be sent by a teacher or some other representative of the student—students themselves may not access the Internet for any purpose other than using the submission website.

### After the Contest

- The submission website will close precisely four hours after the contest timer was started. No submissions will be accepted by the website after this time.
- If any difficulties were encountered, the teacher is welcome to contact the judges by e-mail at *aioquery@amt.edu.au*. While late submissions may be accepted if the judges are contacted, no guarantees are given—decisions will be made on a case by case basis. **In any case, absolutely no submissions will be accepted after 11:59pm on Friday 4 September 2009.**

### Queries and Difficulties

- If you have any questions regarding the contest, please contact the judges by e-mail at *aioquery@amt.edu.au*. Your query will be answered as soon as possible.
- For urgent problems on the day of the contest (such as a lost network connection or errors on the submission website), please contact either Mr Bernard Blackham on 0402 291 684 or Mr David Greenaway on 02 8306 0564.

# Contest Rules

The contest rules are set by the AIOC Problems Committee. This committee alone is responsible for the interpretation of the rules and of the contest questions, and is fully responsible for clarifying or altering the rules or contest questions in unforeseen circumstances.

**Please read these rules well before the contest.** If you have any queries regarding the conduct of the contest, please e-mail your query to [aioquery@amt.edu.au](mailto:aioquery@amt.edu.au). Your query will be answered as soon as possible.

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## Eligibility

- All students currently enrolled in an Australian secondary school (or equivalent overseas institution) are eligible to enter the 2009 Australian Informatics Olympiad.

## Contest Duration and Start Time

- The contest will last for four hours, to be held in a single block. All students at the school must sit the contest at the same time.
- The contest must begin between 9 am and 1 pm inclusive, Australian Eastern Standard Time, on Thursday 3 September 2009. For instance, the contest may be held from 10 am till 2 pm, but not from 2 pm till 6 pm.

## Contest Environment

- Each student should have access to one and only one computer.
- Students may, if desired, use the following resources:
  - C, C++, Pascal, Java or Visual Basic compilers, PHP or Python interpreters, debuggers and associated IDEs;
  - calculators and printers;
  - any books or other written material, including printed source code;
  - any documentation in electronic form, such as help files—this does *not* include electronic source code;
  - the submission website <http://orac.amt.edu.au/aio/>, for submitting solutions or viewing sample solutions to past problems;
  - other people for administrative matters (e.g., “*How much time do I have left?*”, “*Are we allowed to use calculators?*”, “*Why is there smoke coming out of my monitor?*”).

- Students may *not* use the following resources during the contest:
  - compilers or interpreters for any computer language other than those listed above;
  - the Internet, for any purpose other than accessing the submission website described above;
  - any source code in electronic form (either your own code, sample code that comes with your compiler or non-standard libraries that come with your compiler);
  - other people for technical matters (e.g., “How do you program a for loop in Pascal?”, “What does this paragraph in the question mean?”, “How many bytes does an integer take up?”). Any such queries regarding the contest or the contest paper should be e-mailed to the judges at [aioquery@amt.edu.au](mailto:aioquery@amt.edu.au).
- Students may not communicate with other contestants.

## Program Restrictions

- Students should write a computer program to solve each problem.
- Programs should read input only from the input file(s) specified in the question statements, and should send output only to the output file(s) specified in the question statements. The input and output files should be assumed to be in the current directory. **Any output to the screen will be ignored, and no input from the keyboard will be supplied.**
- The format of the input file will be specified in each problem statement.
- The desired format of the output file will also be specified in each problem statement. If you do not adhere to this output format, you may lose marks for your solution. The only exception to this will be that judges will ignore any spaces at the beginning and end of each output line.
- Each solution should be a *single* source file, written in one of the following languages:
  - C
  - C++
  - Pascal
  - Java
  - Microsoft Visual Basic
  - Visual Basic .NET
  - PHP
  - Python
- Java solutions must be contained in a single class called `Solution` and must be run from the routine

```
public static void main(String[] args)
```

within this `Solution` class.
- Visual Basic solutions must be run from the subroutine `Main()` and must not use any forms (i.e., each solution must be a console application).
- Regarding the use of libraries or other external functions:
  - C and C++ programmers may only `#include` headers from the standard C and C++ libraries. In particular, C++ programmers are allowed to use the `string` class and container classes such as `vector` and `list`.

- Pascal programmers may not import any units except for *Math*, *Strings* and/or *SysUtils*.
- Java programmers may not use any classes aside from those in packages `java.lang`, `java.io` and `java.util`.  
Java programmers may not use dynamic loading of classes or any of the introspection features of the language. For instance, routines such as `Class.forName()` or classes such as `java.lang.ClassLoader` may not be used.
- PHP programmers may not use any functions provided by extensions or external libraries.
- Python programmers may not import any packages except for *sys*.
- Programs must be single-threaded and single-process. For instance, C and C++ programmers may not call `fork()` or `system()`, and Java programmers may not use the class `java.lang.Thread` or call `Runtime.exec()`.
- Students may be disqualified if their programs:
  - attempt to read from or write to any files other than those specified in the problem statements;
  - attempt to make network connections;
  - contain any malicious code designed to harm or alter the judges' computer(s);
  - otherwise attempt to subvert the judging system.
- The source code for each solution must not exceed 40,000 bytes in size.

## Time Limits

- Each program must run within the time limit specified in the question statement. If, during judging, a program does not run within the time limit for a particular input file, it will receive a score of zero for that input file.
- Much of the judges' input data will be far more taxing than the sample input given in the question statements, and may push your program over the time limit. In this way, efficient programs will be rewarded.
- Judging will be performed on a system at least as fast as a 3.2GHz Pentium 4, and all time limits refer to this judging machine.
- Programs written in Visual Basic, Java, PHP or Python may run slower due to the overhead of the associated interpreters and/or virtual machines. The judges may at their discretion increase the time limits for these languages accordingly. *Contestants should note that this will not give these languages an advantage.*

## Judging

- Each question will be scored out of 100. All questions are of equal value and all questions may be attempted.
- Programs will be compiled and run on the judges' machine(s) using the following compilers/interpreters:
  - GNU C/C++ Compiler 3.4.4 or later (Win32/Cygwin);
  - Borland Delphi 2.0 for Pascal (this is an extension of Borland/Turbo Pascal);
  - Sun Java SE 6 (version 1.6);
  - Microsoft Visual Basic 6.0;

- Microsoft Visual Basic .NET 2003 or later;
  - PHP 5.2 or later;
  - Python 2.5 or later.
- In judging a question, several input scenarios will be presented to the program. Each input scenario will result in a score between 0% and 100%. Individual question statements provide further details as to how this score is calculated. The final score for the question will be a weighted average of the scores for all input scenarios presented.
  - The judges reserve the right to re-examine any contestant for any reason before declaring official results.
  - In the event of ties, the judges reserve the right to either declare ties or to rank students using alternate means.

## Why Did I Score Zero?

Candidates sometimes score zero even though they believe that they have a working solution to a problem. Below are some of the common reasons that good solutions score zero.

Note that examples of solutions that score 100% in the various AIO languages can be found on the website <http://orac.amt.edu.au/aio/>.

### Incorrect Input and Output Files

Each problem statement lists the names of its input and output files, similar to the example below.

**Input File:** *zeroin.txt*

**Output File:** *zeroout.txt*

In this example, if you try to open any of

- "a:\zeroin.txt";
- "c:\mydir\zeroin.txt";
- App.Path & "\zeroin.txt";
- "input.txt"

then the file you are looking for will almost certainly *not* be on the judging machine and your program will score zero. Just open "zeroin.txt" without any additional directory information. The same goes for the output file.

### Keyboard and Mouse Input

Your program should not be interactive. It should not have a graphical user interface. It should simply read from the input file, write to the output file, and exit. If your program requires any input from the user, the judging software will not supply this input and you will exceed the time limit. Examples include:

- "Please enter the following value...";
- "Press any key to exit...";
- Providing a form on which the user has to click a button to start the program.

### Incorrect Output Format

Each problem is very precise about how the output file should be formatted. Your score is assigned by a judging program which tries to automatically extract your solution from your output file. Every problem statement includes sample input and output files, as a way of illustrating these formats. For Problem 1 on the Intermediate paper, the sample output file contains the single line:

1200

In this example, the following output files would almost certainly score zero:

- The answer is 1200.
- "1200"

### Violating Contest Rules

Each year a few programs are submitted that violate the contest rules. Be sure to read the *Program Restrictions* section of the rules, which details specific restrictions for each programming language. If you are unsure about anything then please mail [aioquery@amt.edu.au](mailto:aioquery@amt.edu.au) for clarification.