



Computer Olympiad

South African Computer Olympiad: a project of the Computer Society of South Africa.

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SECOND ROUND 2010

This paper is for **ALL** candidates.
Each correct answer earns 5 marks.

Problem 1: Palin

Alice really enjoys word games. At the moment she is looking at Palindromes. Palindromes are words which read the same forwards and backwards like "madam", "racecar" and "anna".

Help Alice by writing a program which will read in a single word (only lower case letters) and output "Is a Palindrome" if it is a Palindrome, or otherwise output "Is Not a Palindrome"

Example

Enter a word: `madamimadam`

Is a Palindrome

Test your program with:

- (a) abcdeeedcba
- (b) notapalinanot
- (c) amanaplanacanalpanama

Problem 2: Fizzbuzz

Alice's maths class has been playing a game called Fizzbuzz. In this game, players count from 1 up to some number N , but when they get to a number that is a multiple of three, they say "fizz" instead of the number; similarly, multiples of five are replaced by "buzz". Numbers that are multiples of five and three are replaced with "fizzbuzz".

Alice wants to practice on her own, so she wants you to write a program to check that she is getting it right. It will ask the user for the number N and then output all the numbers from 1 to N , replacing multiples of three and five as described.

Example

Count to what number? 7

```
1
2
fizz
4
buzz
fizz
7
```

Test your program with:

- (a) 10
- (b) 15
- (c) 32

Problem 3: 133t

Alice has sent an SMS to her friend Bob using a secret code. Knowing that Alice replaced "E" with "3", "L" with "1", "O" with "0", "G" with "9" and "B" with "8", help Bob (or "808") decrypt the message. Given a sentence of only upper case characters (and spaces), display the decrypted sentence for Bob to read.

Example

Enter message: `H3110 808 ITS A1IC3 H3R3`

HELLO BOB ITS ALICE HERE

Test your program with:

- (a) HOW IS YOUR HOM3WORK 90IN9
- (b) 90T T0 90 MY MOM IS CA11IN9 M3
- (c) I H3ARD TH3 N3XT QU3STION IS A80UT MANSIONS

Problem 4: Mansion

You are in a creepy, unlit mansion. The mansion can be represented as an $N \times M$ grid, with lights in some of the grid cells. A light illuminates the cell it's in and its (up to eight) neighbouring cells. There is a light in the cell where you start that is switched on; all other lights are switched off. Your task is to light up as much of the mansion as possible,

