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COMPUTER SCIENCE
STANDARD LEVEL
PAPER 2

Monday 17 November 2008 (morning)

1 hour 30 minutes

INSTRUCTIONS TO CANDIDATES

- Do not open this examination paper until instructed to do so.
- Answer all the questions.

*Answer **all** the questions.*

1.　Two parallel arrays contain the names and telephone numbers of up to 200 people. Both arrays are of type String and unordered. New names are added to the end of the array. The last valid name in the array is followed by the end-of-data marker `"XXXX"`.

	[0]	[1]	[2]	[3]	...	[65]	[66]	...	[199]
names	"Ally"	"Gioia"	"Alan"	"Jordan"	...	"Max"	"XXXX"	...	-
telephone numbers	"123456"	"654321"	"002233"	"334422"	...	"554433"	-	...	-

(a)　State the number of names stored in the above array.　*[1 mark]*

(b)　Construct a method, `findName`, which takes a String parameter representing the telephone number and returns the name of the corresponding person, or `"XXXX"` if the number is not present.　*[7 marks]*

(c)　Without constructing an algorithm, outline the steps that should be taken to bubble sort the data in order of name.　*[8 marks]*

(d)　State **two** reasons why the telephone numbers are stored as String data and not int values.　*[2 marks]*

(e)　Describe another data structure that could have been used in place of two parallel arrays.　*[2 marks]*

2. A programmer is writing a class to hold the following data about cities: the city name, highest and lowest recorded temperatures (as whole numbers) and whether the lowest temperature is below zero or not.

```
public class City
{ // data members
  private String name;

  // Constructor for objects of class City
  public City(String cityName) { setName(cityName); }

  // This is a mutator method
  public void setName(String s) { name = s; }
}
```

The highest recorded temperature in any of the cities is between 5 and 50 degrees.

(a) Complete the class definition by

    (i) identifying suitable data types and names for the data members (the city name is already done for you); *[3 marks]*

    (ii) constructing a mutator ("set") method, similar to `setName` to validate the data member storing the highest recorded temperature. If the value lies outside the range above, set the highest recorded temperature to –1. *[4 marks]*

(b) Construct an algorithm to create an array of five cities and initialise them with the city name, input by the user. *[6 marks]*

(c) Construct an algorithm to find and output the greatest temperature difference in the following two arrays.

```
int[] highTemps = new int[20];
int[] lowTemps = new int[20];
```

You may assume the arrays hold 20 valid values and that `highTemps` is always larger than `lowTemps` for any given index.

Note that you do not need any of the code written previously in parts (a) and (b) to construct the required algorithm. *[7 marks]*

3.   *This question requires the use of the Case Study.*

    (a)   Outline **three** ways in which text-to-speech systems can assist disabled people.   *[6 marks]*

    (b)   Outline **two** steps every web designer should take to improve accessibility for all disabled users.   *[4 marks]*

    (c)   An airline company is building a new booking system. The staff using it must search a text-based flights database, enter customer information and print tickets.

        (i)   Outline **two** suitable adaptations of, or replacements for, the standard input devices (mouse, keyboard) for a person who has no fine hand control.   *[4 marks]*

        (ii)   Outline **two** suitable adaptations of, or replacements for, the standard output devices (screen, printer) for a person who is completely blind.   *[4 marks]*

    (d)   A person with limited head movement and no use of their limbs, wishes to access their bank account via the Internet. The person has a full-time nurse to look after them.

        (i)   For this person, discuss the implications of **one** method of maintaining security.   *[4 marks]*

        (ii)   Discuss **two** problems associated with voice-activated wheelchairs.   *[4 marks]*

        (iii)   Explain the need for analogue to digital conversion in a voice-activated system.   *[4 marks]*