M11/5/COMSC/SP2/ENG/TZ0/XX

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COMPUTER SCIENCE
STANDARD LEVEL
PAPER 2

Friday 20 May 2011 (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. The following integer array `sales[]` gives the sales figures for 6 salespersons for one month. The salespersons are identified with an ID number from 0 to 5.

0	1	2	3	4	5
250	360	500	245	123	520

(a) State the sales for salesperson with ID 3 for this month. *[1 mark]*

(b) Construct the code fragment started below, that outputs the highest number of sales.

```
int bestSales = 0;
for (...
{
  // lines of code missing
}
output("Best sales = " + bestSales);
```

[3 marks]

(c) Construct a modified algorithm to output the ID of the salesperson with the highest number of sales. *[2 marks]*

Sales figures for an entire year are stored in the two-dimensional integer array `theYearSales[][]`, with one row for each month and one column for each salesperson.

	0	1	2	3	4	5
0	250	360	500	245	123	520
1	520	658	752	145	360	25
2	850	96	542	875	563	25
3	1000	528	753	654	125	583
⋮						

In the above illustration of the array, the sales by salesperson with ID 3 in March were 875 as represented in `theYearSales[2][3]`.

(d) State the sales by salesperson with ID 4 in February. *[1 mark]*

(This question continues on the following page)

(Question 1 continued)

(e) Construct the method started below that returns the total sales for the year for a given salesperson's ID.

```
public int totalSales(int id)
{
  // lines of code missing

  return tot;
}
```

[3 marks]

(f) By making use of the `totalSales()` method from part (e), construct the method `bestSalesperson()` that returns the ID of any salesperson with the highest sales for the year. *[6 marks]*

(g) Suggest the changes that would need to be made to output the salesperson's name instead of the ID. *[4 marks]*

2. A program has been written for the purpose of processing data about cities and producing a national survey.

For each city, the following data is stored:
- name
- area in km^2
- population.

The following class `City` has been devised for this purpose.

```
class City
{
  public String name;
  public double area;
  public int population;

  public City(String n, double a, int p)   // constructor
  {
    // lines of code missing
  }

  // other methods are available here
}
```

(a) Outline the difference between the data types **`int`** and **`double`**. *[2 marks]*

(b) With reference to the class defined above, explain the importance of making the constructor **`public`**. *[2 marks]*

(c) A `City` object can be created as shown below.

```
City c1 = new City("Cardiff", 75, 300000);
```

Explain what happens when the line above is executed. *[3 marks]*

(d) State the value of the data item `c1.name`. *[1 mark]*

(e) (i) Describe an efficient way of creating 100 objects of class `City`, that need to be adequately stored for further processing. *[2 marks]*

(ii) Construct the method that returns the name of the city with the highest population. *[4 marks]*

(f) The 100 `City` objects are to be sorted into ascending order of population, using a bubble sort algorithm. Without writing code, outline the steps needed to sort the objects. *[6 marks]*

3. *This question requires the use of the case study.*

(a) With reference to the diagram on page 3 of the case study, explain the advantage of networking the Air Traffic Control (ATC) system with the Flight Information Display System (FIDS). *[2 marks]*

(b) (i) Identify **one** communication medium which would be used to connect different parts of the airport network. *[1 mark]*

(ii) Suggest reasons for the communication medium identified in part (i). *[2 marks]*

(c) Describe a suitable security measure that could confirm the identity of employees as they pass through the various sections of the airport. *[2 marks]*

(d) Describe **two** features related to computer systems found inside a modern airport that improve the passenger experience. *[4 marks]*

(e) A modern airport relies on highly computerized systems. By making reference to **one** area of airport operation, discuss how this can be both an advantage and a disadvantage for the traveller. *[5 marks]*

(f) Suggest how tagging passengers inside an airport could

(i) improve airport security; *[2 marks]*

(ii) help the airlines maintain their schedules. *[2 marks]*

(g) (i) With reference to the baggage system on page 9 of the case study, suggest **two** ways in which the use of computer simulation in the development of the baggage system would have been beneficial to the design team. *[4 marks]*

(ii) Explain why maintenance is an important part of the system design cycle. *[3 marks]*

(h) Explain why encryption should be an important feature of Wi-Fi hotspots. *[3 marks]*