



88127014



**COMPUTER SCIENCE
STANDARD LEVEL
PAPER 2**

Friday 9 November 2012 (morning)

1 hour 30 minutes

INSTRUCTIONS TO CANDIDATES

- Do not open this examination paper until instructed to do so.
- Answer all the questions.
- A clean copy of the **Computer Science** case study is required for this paper.
- The maximum mark for this examination paper is [70 marks].

Answer **all** the questions.

1. Consider the array `dArray` and program fragment shown below.

	[0]	[1]	[2]	[3]	[4]	[5]
<code>dArray</code>	7	2	9	-3	4	1

```

n = 6;
for (int i = 1; i < n; i = i + 1)
{
    if (dArray[i] < dArray[i - 1])
    {
        int t = dArray[i];
        dArray[i] = dArray[i - 1];
        dArray[i - 1] = t;
    }
}

```

(a) **Copy** and complete the following table showing the contents of the array `dArray` after each pass through the loop.

[5 marks]

Original	7	2	9	-3	4	1
1st pass						
2nd pass						
⋮						

(b) Describe the results of running the code fragment.

[2 marks]

(c) Construct a method `doIt(int[] dArray)` that takes an array of any size as a formal parameter and which contains the code fragment, setting a reasonable value for the variable `n` based on the size of the array. The method should return the number of times the condition `dArray[i] < dArray[i - 1]` is true.

[7 marks]

(d) Explain why the method call `doIt(dArray)` is able to change the contents of the array `dArray`.

[2 marks]

(e) Construct a method that will repeatedly call the method `doIt()` until it returns zero.

[2 marks]

(f) State the number of times the method `doIt()` will be called if the values in the array `dArray` are in:

(i) ascending order;

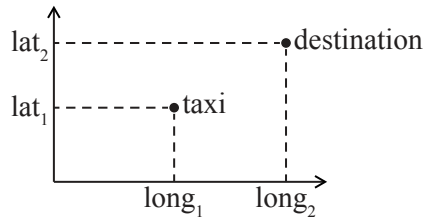
[1 mark]

(ii) descending order.

[1 mark]

- 2. A taxi firm has twenty different locations (stands) in the town where its taxis can wait for passengers.

Each taxi has an onboard Global Positioning System (GPS) device which provides the present location of that taxi as two coordinates: latitude (lat) and longitude (long). With this information, it is possible to calculate the distance to a given destination.



- (a) State the location of the taxi as a pair of coordinates. [1 mark]

An object of class type `Location` defines the coordinates of a location.

```
public class Location
{
    double latitude;
    double longitude;
    // constructor
}
```

- (b) Construct a constructor method that takes two `double` arguments to initialize the latitude and longitude coordinates of a new `Location` object. [3 marks]

The distance between location A and location B within the town is approximated by

$$\sqrt{((lat_A - lat_B)^2 + (long_A - long_B)^2)}$$

- (c) Construct the `distance(Location A, Location B)` method, that returns the distance between two locations. You can use the method `sqrt()` to calculate the square root. [3 marks]

A computer onboard the taxi receives the taxi's current position from the GPS. It also has a file containing the locations of all the taxi stands. The array `AllStands` contains the locations of all twenty taxi stands.

- (d) Construct the `closest(Location[] AllStands, Location B)` method that searches through the array `AllStands` and returns the index of the point closest to location B. You should use the `distance()` method from part (c). [6 marks]

After taking a passenger to their destination, the taxi must return to a stand.

- (e) Explain how the onboard computer could provide the driver with a list of the five closest taxi stands ordered by their distance from that taxi's present location. [5 marks]

In some cases it might take longer to reach the closest taxi stand than to reach one of the other stands.

- (f) Outline **one** reason why this may occur. [2 marks]

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

- (a) State **two** differences between Wi-Fi and WiMAX. *[2 marks]*
- (b) State **two** differences between Wi-Fi and Bluetooth. *[2 marks]*
- (c) Explain **two** reasons why a mobile phone designer might choose to provide a keyboard instead of a touch screen. *[4 marks]*
- (d) Explain **two** ways in which using a mobile phone to link an ambulance to a hospital could compromise the privacy of a patient. *[4 marks]*
- (e) Outline **two** ways in which data interception can occur when using a mobile device. *[4 marks]*
- (f) Outline **two** advantages of not restricting the development of apps to the manufacturers of mobile devices. *[3 marks]*
- (g) Describe how social engineering is used to persuade mobile device users to reveal personal information. *[4 marks]*
- (h) Identify the type of memory in which the software for controlling a mobile device is most likely to be stored. *[1 mark]*

Many employers are providing their employees with mobile devices so that they can be connected to their work 24/7.

- (i) Discuss the effects of this on the employee. *[6 marks]*
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