Queen Mary
University of London

Main Examination Period 2018

ECS405U Arts Application Programming Duration: 2 hours 30 minutes

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Answer all FOUR questions

If you answer more questions than specified, only the first answers (up to the specified number) will be marked. Cross out any answers that you do not wish to be marked

Calculators are permitted in this examination. Please state on your answer book the name and type of machine used.

Complete all rough workings in the answer book and cross through any work that is not to be assessed.

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EXAM PAPERS MUST NOT BE REMOVED FROM THE EXAM ROOM

Examiners: Dr Karen Shoop, Dr Julian Hough

Question 1

a) Initialise two variables, called ‘name’ and ‘first’, with your surname and the first letter of your nationality. Suggest two ways in Processing for a developer to ensure that these variables can be accessed in more than one function.

[5 marks]

b) Write the code to initialise two variables – x and y – with random whole numbers between 0 and 15 inclusive. If these are the same then print “YES” followed by the value, e.g. “YES 12”. Otherwise just print “NO”.

[7 marks]

c) Create an array, nArray, that will contain 5 numbers. Then set the first array element as 0.5 and the last one as 67.34.

[5 marks]

d) Write a checkCount function that takes in a word and returns how many times the word appears in an array called aNames. You can assume that this array has been populated and can be accessed by the function.

[8 marks]

Question 2

Two incomplete Java classes are shown in Figure 1.

```
public class Car{
     private int xLoc;
     private String make;
     private int doorNum;

     public Car(String make, int doors){
          xLoc=0;
          //missing code
     }

     public void addMoves(int moves){
          //missing code
     }

     //other methods
}
```

```
public class MakeCar{
     public static void ___GAP A___(String [] args){
          Car c1 = _____GAP B_____
          ____________________GAP C_____
          ____________________GAP D_____
     }
}
```

Figure 1

a) These questions focus on the Car class in Figure 1.

i) What is the name for the block of code that starts ‘public Car’ and what is its role?

ii) Write the two missing lines in this block to assign values to the make and doorNum variables.

iii) Write the missing line of code inside the addMoves method to increment the xLoc variable by the value passed into the method.

iv) Explain whether addMoves is a method definition or a method call.

v) Code using Car objects needs the value of the xLoc variable. Why does a getter/accessor have to be written?

vi) Write the getter/accessor for the xLoc variable.

[13 marks]

Question 2 continues on the next page

Question 2 continued

b) These questions focus on the MakeCar class in Figure 1.

i) What is the missing method name in Gap A?

ii) What is the purpose of this method in Java code?

iii) Write the code in Gap B to complete the creation of the Car called c1, using your own values.

iv) Write the code in Gap C to add 6 moves to c1.

v) Write the code in Gap D that creates a variable called location and assign it the current value of the c1 object using the getter created in question 2a).

[9 marks]

c) A Car is a specialised type of Vehicle.

i) What is the name for this type of relationship in Java?

ii) How could this relationship between the Car and the Vehicle class be added to the Code in Figure 1?

[3 marks]

Question 3

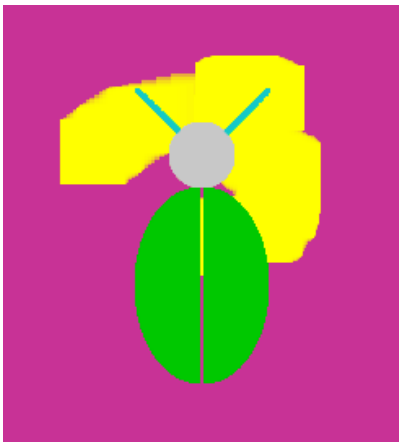

Figure 2

a) Initialise three variables to be used for the bug shown in Figure 2 – head, bodyW, bodyH – with the following values: head is 15 pixels, bodyW is twice head and bodyH is three times head.

[2 marks]

b) Write the line of code that makes the window pink/mauve, as shown in Figure 2.

[2 marks]

c) Write the code that creates the green body of the bug, shown in Figure 2, by drawing two semi-circles – using the bodyH variable for the depth and bodyW for the width – with a 2 pixel gap, centred on the window.

[6 marks]

d) Write the code to place a grey circle – using the head variable for the diameter – on top of the body.

[3 marks]

e) Code the two antennae (sticks) on top of the head by creating two lines starting from the centre of the head. These turquoise lines should be 3 pixels thick.

Why should this code be written before the circle for the head?

[5 marks]

f) A transparent yellow square is drawn in the cursor's location when the user presses the 'y' key. Write the code, using hexadecimal colour format, and explain why a trail of yellow squares appears.

[7 marks]

Question 4

London has a population of 8.8 million, is located at latitude 51.5, with an average summer temperature of 19 degrees Centigrade. Rome has a population of 2.9 million, is located at latitude 41.9, with an average summer temperature of 26 degrees Centigrade. Paris has a population of 2.2 million, is located at latitude 48.9, with an average summer temperature of 20 degrees Centigrade.

a) Represent these data as Comma Separated Values/Variables, with no header. Ignore the 'million' for population, e.g. write 8.8 not 8.8million, and ignore the degrees metric.

[3 marks]

b) The data in the CSV file, Cities.csv, is assigned to a variable, called lines, using the Processing loadStrings function. What variable type is lines?

[2 marks]

c) Write a full sketch to do the following, using Processing's setup() and draw() functions: What is the name for this type of relationship in Java?

i) Read in the Cities.csv file using either one of the two Processing functions covered on this module.

ii) Output the city name in black, a distance of 'diam' (value 20) from the left hand side of the window, so that height of the cities reflects their line of latitude (higher figures should be higher up the window).

iii) Represent the population size as a line of non-overlapping circles, diameter 'diam', after each city name, such that each circle represents a whole million, e.g. 8 circles for London.

iv) Represent the summer temperature as the circle colour: blue if less than 20 degrees, red if more than 25, otherwise orange.

[16 marks]

d) Write code that shows the population of London when hovering over the last London circle. There should be no trail so state what other code has to be added and where.

[4 marks]

End of Paper