UNIVERSITY OF LONDON

GOLDSMITHS COLLEGE

Department of Computing

B. Sc. Examination 2018

IS51008C
Introduction to Programming

Duration: 2 hours 15 minutes

Date and time:

This paper is in three parts: part A, part B and part C, with the following questions

There are 3 questions in part A of which you should answer 2.
You should answer all of part B.
There are 3 questions in part C of which you should answer 2.

Your answers to part A should be written in separate answer book to the answers to part B and C.

Full marks will be awarded for complete answers to a total of 5 questions, 2 from part A, 1 from part B and 2 from part C. The questions in part A carries 10 marks each. The question in part B carries 8 marks. Each question in part C carries 6 marks. The marks for each part of a question are indicated at the end of the part in [.] brackets.

Each part of the question in part B is multiple choice. You should choose one and only one answer and write down the number of your chosen answer.

There are 40 marks available on this paper.

No calculators should be used.

THIS PAPER MUST NOT BE REMOVED
FROM THE EXAMINATION ROOM

Part A

Your Project

Answer two questions from this part. These questions all refer to the project you did for this module. Please use a separate answer book for these questions.

All of these questions will be marked based on the quality of the code and coding process as you describe it. Marks cannot be awarded unless your description shows clear understanding of the code.

Question 1

What were the most important functions or methods in your program, describe their parameters, return values, and how they were used. [10]

Question 2

Describe how you used objects and object orientation in your program. [10]

Question 3

Describe one difficult runtime error you encountered in your program. Explain how you found and fixed the bug. [10]

The mark scheme for all questions in this part is the following:

1-3. a description showing limited understanding of basic code

4. a description of very basic code

5. a description of competent code that uses the techniques taught in class well

6. a description of well designed code that goes slightly beyond what was taught in class

7-8. a description of well designed code that goes considerably beyond what was taught in class

9-10. a description showing deep understanding of code that is beyond the scope of what would usually be expected at undergraduate level

Part B

Answer all questions in this part

Question 4 Each Question has one correct answer

(a) What is the `while` keyword for? [1]

i. selecting which code to run
ii. declaring new methods in an object
iii. running the same code multiple times
iv. pausing execution of the code for a set amount of time

(b) In the following code what is mystery? [1]

```
if(x < 7){
  myObj.mystery(200,200);
}
else{
  myObj.mystery(300,300);
}
```

i. a statement
ii. a method
iii. a variable
iv. a property

(c) What does a constructor function return? [1]

i. null
ii. a string
iii. undefined
iv. this (reference to an object)

(d) Upon execution of the following `if` statement what is displayed in the console? [1]

```
var a = 2;

if (a >= 0 && false) {
  console.log("cat");
} else {
  console.log("dog");
}
```

i. cat

ii. dog

iii. an error message

iv. none of the above

(e) Which of the following draws 5 rectangles to the screen? [1]

i.
```
for(var i = 0; i < 60; i+=10){
    rect(i*10, 40, 80, 80);
  }
```

ii.
```
for(var i = 0; i < 50; i+=10){
    rect(i*10, 40, 80, 80);
  }
```

iii.
```
for(var i = 0; i < 50; i++){
    rect(i*10, 40, 80, 80);
  }
```

iv. None of the above

(f) Which of the following accesses "Donald" from the groups array? [1]

```
groups = [["Colin", "Chris", "Claire", "Catherine", "Cody"],
          ["Daisy", "Delia", "Derek", "Donald", "Danny"],
          ["Ernest", "Elanor", "Eliza", "Eric", "Elizabeth"],
          ["Frida", "Freddy", "Fiona", "Finn", "Fatima"]];
```

i. groups[1][3]

ii. groups[2][4]

iii. groups[4][2]

iv. none of the above

(g) What does the push method do to an array? [1]

i. adds an item to the beginning of the array

ii. adds an item to the end of the array

iii. removes the last element of the array

iv. adds an item to the specified index of the array

(h) Assuming `a` is a correctly initialised array does the following code throw an error? [1]

```
for(var i = a.length; i >= 0; i--){
  console.log(a[i]);
}
```

i. True

ii. False

Part C

Answer 2 questions from this part.

Question 5

Consider the following array of strings:

```
var cars = ["Ford Focus", "Volkswagen Golf", "Audi TT",
            "Mini Cooper", "Fiat 500"];
```

(a) Using the array `splice` method remove "Audi TT" from the array. [1]

(b) Write a `for` loop to display the contents of the array to the browser console. [2]

(c) Imagine an object that represents a car in a simple racing game. List two properties of the object and one method. Explain what each one does. [3]

Question 6

Study the following code snippet careful.

```
function setup(){
    createCanvas(800, 800);
    noStroke();
}

function draw(){
    background(255);
    for (var x = 0; x < 8; x++){
      for (var y = 0; y < 8; y++){

        if(x%2 == 0 && y%2 != 0 || x%2 !=0 && y%2 == 0){
          fill("black");
        }

        else{
          fill("white");
        }

        rect(x*100, y*100, 100, 100);
      }
    }
}
```

(a) What does the code above do? [2]

(b) The code above sets the fill colour using colour name strings. Describe how else you could set the colour. [1]

(c) Explain in detail what the following line of code does: [2]

```
if(x%2 == 0 && y%2 != 0 || x%2 !=0 && y%2 == 0)
```

(d) Describe what alternative syntax you could use to replace the nested `for` loop. [1]

Question 7

The following code includes a definition of a cat object literal:

```
var cat;
var catImage;

function preload(){
    catImage = loadImage("assets/tom.jpg");
}

function setup(){
    createCanvas(800, 800);

    cat = {
       name: "tom",
       img: catImage,
       pos_x: 100,
       pos_y: 100,
       width: 200,
       height: 200,
       speak: function(){
        text("Meow", this.pos_x - 10, this.pos_y-10);
       },
       display: function(){
        image(this.img, this.pos_x, this.pos_y,
                        this.width, this.height);
       }
    };


}

function draw(){
    background(255);
    cat.speak();
    cat.display();
}
```

(a) Rewrite the cat object literal using a class or a constructor function. [4]

(b) Explain some of the benefits of a class or constructor function over an object literal. [2]