

UNIVERSITY OF LONDON

GOLDSMITHS COLLEGE

Department of Computing

B. Sc. Examination 2015

IS51008B

Introduction to Programming

Duration: 2 hours 15 minutes

Date and time:

This paper is in two parts, Part A and Part B. There are a total of 2 questions in Part A and 3 in Part B. You should answer ONE question from Part A and TWO questions from Part B. Your answers to Part A and Part B should be written in separate answer books.

Full marks will be awarded for complete answers to a total of three questions, one from Part A and two from Part B. Each question in part A carries 20 marks. Each question in part B carries 10. The marks for each part of a question are indicated at the end of the part in [.] brackets.

There are 40 marks available on this paper.

Electronic calculators are not allowed.

**THIS PAPER MUST NOT BE REMOVED
FROM THE EXAMINATION ROOM**

PART A

Question 1

This question relates to the mini-project that you did in the second term.

- (a) Briefly describe your project [1]
- (b) Many programs include a number of different, related things: many enemies in a game, many images in a photo album program, many songs in an audio player. Describe an example of how you used multiple similar objects in your program and what programming techniques you used to implement them. [9]
- (c) What was the biggest problem you encountered while working on your project? This could be a bug in your program or something you did not initially know how to implement. Describe how you tried to solve this problem, including a detailed description of the eventual technical solution [10]

Question 2

This question relates to the mini-project that you did in the second term.

- (a) Briefly describe your project [1]
- (b) Describe how you used `if` statements and Boolean expressions to control your program. [9]
- (c) Choose a class that you created for your project and describe how you designed it, including how you chose the variables and functions, and how you implemented them. [10]

PART B

Question 3

Parts (a) to (d) of this question are multiple choice. Please choose only *one* best answer and write down the letter corresponding to that answer.

(a) What values can a boolean variable have? [1]

- a) whole numbers
- b) fractional numbers
- c) true or false
- d) a-z

(b) You are making a social media site, in which people's profiles have to be displayed differently if you are following them or not. What would you use to do this? [1]

- a) for loop
- b) if statement
- c) array
- e) float variable

(c) If `b` is a variable of the class `Ball` (below), how would you call the method (member function) `draw`? [1]

```
class Ball{
    int radius;
    Ball(int r){
        radius = r;
    }
    void draw(int x, int y){
        ellipse(x, y, radius, radius);
    }
}
```

- a) `b.draw()`;
- b) `Ball.draw(b)`;
- c) `b.draw(100, 20)`;
- d) `Ball.draw(100, 20)`;

(d) You get a `NullPointerException` in the following lines of code (which draw a set of images in an array). What do you think is wrong?

[1]

```
for (int i = 0; i < 10; i++) {  
    image(myimages[i], 100*i, 20);  
}
```

- a) the variable name `myimages` is misspelt
- b) there are fewer than 10 elements in the array
- c) some of the images are off the edge of the screen
- d) some of the images files could not be found

(e) The Microsoft Kinect is a popular gaming input device. It senses a person's body posture. From the point of view of a programmer, it gives you the position (as x,y,z coordinates in 3D space) of each of the joints (neck, torso, elbows, knees etc.)

A popular use of the kinect is for dancing games in which a player has to perform a certain move at a certain time in a song. How would you go about programming such a kinect game?

You are not expected to know the details of the kinect API, but make some plausible assumptions and think about how you would store and use the data to implement the gameplay.

[6]

Question 4

Parts (a) to (d) of this question are multiple choice. Please choose only *one* best answer and write down the letter corresponding to that answer.

(a) If a class B has member variable a, how many versions of a exist in memory? [1]

- a) none
- b) one
- c) one for each variable of type B
- d) one for each object of type B

(b) What type would you use to represent a person's friends on a social media site? [1]

- a) String
- b) boolean
- c) float
- d) array

(c) What will the following code print? [1]

```
int a = 0;
int b = 3;
if((a < b && !(a < 0)) || b < 0){
    print("yes");
}else{
    print("no");
}
```

- a) yes
- b) no
- c) yesno
- d) nothing

(d) You are trying to print display the numbers from 1 to 10 in reverse order but this code does not work. What should you change? [1]

```
for (int i = 10; i < 0; i--){
    text("number " + i, 10, 20*(10-i));
}
```

- a) i should be a float
- b) change `i < 0` to `i >= 0`
- c) change `int i = 10` to `int i < 10`
- d) change `i--` to `i++`

(e) A fellow student posts the follow request to a forum. What do you think their program is supposed to be doing? What would you suggest? [6]

Help, my program doesn't work!

```
Invada i;

void setup() {
    size(640, 480);
    background(0);
}

void draw() {
    for (int i = 0; i < 20; i++)
    {
        i.draw();
    }
}

class Invada {
    int posX, posY;
    Invada(int x, int y) {
        posX = x;
        posY = y;
    }
    void draw() {
        posX += 1;
        ellipse(posX, posY, 20, 20);
    }
}
```

Question 5

Parts (a) to (d) of this question are multiple choice. Please choose only *one* best answer and write down the letter corresponding to that answer.

(a) Which is not part of the definition of a for loop? [1]

- a) starting condition
- b) ending condition
- c) else section
- d) increment

(b) You are writing a calendar application, which of these would be **unlikely** to be a member variable of an event class?

[1]

- a) date
- b) today's date
- c) location
- d) name

(c) Which line of code draws all images in the array called "imgs", making them evenly spaced horizontally across the screen? [1]

- a)

```
for(int i = 0; i < imgs.length; i+=width/ imgs.length){
    image(imgs[i], i, 20);
}
```
- b)

```
for(int i = 0; i < imgs.length; i++){
    image(imgs[i], i* width/ imgs.length, 20);
}
```
- c)

```
for(int i = 0; i < width; i++){
    image(imgs[i], i* width/ imgs.length, 20);
}
```
- d)

```
for(int i = 0; i < 10; i++){
    image(imgs[i], i, 20);
}
```


(d) This code is supposed to animate a circle moving across the screen left to right and then going back to the left when it reaches the right hand side of the screen? However, it does not return when it reaches the end. What needs to be changed to make it work? [1]

```
posX += speedX;
if(posX == width) {
    posX = 0;
}
ellipse(posX, posY, 20, 20);
```

- a) posX should be changed to a float
- b) posX should be changed to an int
- c) posX == width should be changed to posX > width
- d) posX == width should be changed to posX < width

(e) Mobile devices are increasingly being used for fitness tracking applications. These applications keep track of your physical activity in a variety of ways. They can allow you to enter when you do particular activities (played football, went to a yoga class), but also use sensors to directly track measures of activity, for example heart rate sensors, or accelerometers to detect your footsteps. This data is stored for each day (or in some cases more frequently, each hour) and users can track how their activity changes over time (for example seeing a graph of their activity over the last month). What are the main classes you would need to create a fitness app of this sort. Describe a rough implementation of each of the main classes. [6]

END OF EXAMINATION