York University

AK/ITEC 1620 3.0
OBJECT-BASED PROGRAMMING

Midterm Test – Sample

Examiner: S.Y. Chen
Duration: One Hour and Fifteen Minutes

This exam is closed textbook(s) and closed notes. Use of any electronic device (e.g. for computing and/or communicating) is <u>NOT</u> permitted.

Do not unstaple this test book – <u>any detached sheets will be discarded</u>. Answer all questions in the space provided. No additional sheets are permitted.

Work independently. The value of each part of each question is indicated. The total value of all questions is 60.

Write your name and student number in the space below. Do the same on the top of each sheet of this exam where indicated.

NOTE: YOU MAY USE PEN OR PENCIL, BUT ANSWERS IN PENCIL WILL NOT BE CONSIDERED FOR REGRADING.
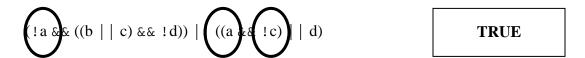
Surname: _____

Given Names: _____

Student Number: _____

Q1. _____   **Q4.** _____

Q2. _____   **Q5.** _____

Q3. _____

Total

Question 1a (5 marks) Evaluating Conditions:

When a condition is evaluated in JAVA, it is useful to know both its result (TRUE or FALSE) and which terms were evaluated. For the conditions listed below, please circle all terms that were evaluated and give the final result of the condition. Note: terms in a condition are only evaluated if the (sub) result is still unknown.

Example :

```
boolean    a = true, b = true, c = false, d = false;
```

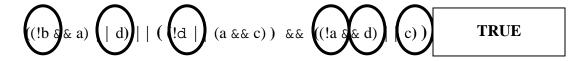(!a && ((b || c) && !d)) | ((a && !c) || d)   **TRUE**

After evaluating !a, the left sub-result is known to be FALSE. Skipping to the next term in the OR expression, a is TRUE so the next term in the AND expression is evaluated. Upon evaluating !c, (a && !c) is TRUE and the right sub-result is known to be TRUE. The overall result is now known to be TRUE, so no further terms need to be evaluated.

Please answer both parts below.

Part 1 (**2.5 marks**):

```
boolean    a = false, b = true, c = true, d = false;
```

(((!b && a) || d) || ((!d || (a && c)) && ((!a && d) || c))   **TRUE**

Part 2 (**2.5 marks**):

```
boolean    a = true, b = false, c = false, d = true;
```

(((!b && a) || d) || ((!d || (a && c)) && ((!a && d) || c))   **TRUE**

Question 1b (5 marks) Designing if statements:

You are trying to organize an on-line, video game tournament. The tournament requires an even number of players. Thus, after including yourself and your roommate, <u>you need to invite an *even* amount of friends</u>. Since it would be impolite to invite some but not all of a set of friends, you note that you have an even number of neighbours, an odd number of co-workers, and an odd number of regulars.

neighbours	even
co-workers	odd
regulars	odd

In a JAVA program, there are three boolean variables – **neighbours**, **coworkers**, and **regulars**. The value of each variable is **true** if you choose to invite that set of friends, and **false** otherwise.

Write an **if** statement that will set the boolean variable **even** to **true** if the invited set(s) of friends creates an even number of <u>total</u> players (<u>including yourself and your roommate</u>), and to **false** if the invited set(s) of friends results in an odd number of total players.

Please write your answer below.

```
if ((coworkers && regulars) || (!coworkers && !regulars))
     even = true;
else
     even = false;
```

Surname:_____ First name:_____ Student #: _____

Question 2 (10 marks) Evaluating JAVA Code:

Please answer both parts below. Note: you must show your work to receive any credit.

Part 1 (**5 marks**):

```
int x = 0;
for (int i = 0; i < 10; i++)
{
        if (i % 3 == 0)
                x += 50;
        else if (i % 5 == 0)
                x += 20;
        if (i % 5 == 0)
                x += 10;
}
```

i	x
0	50/60
1	60
2	60
3	110
4	110
5	130/140
6	190
7	190
8	190
9	240

What is the final value of x?

240

Part 2 (**5 marks**):

```
int x = 0;
int y = 25;
while (x < y || y < 50)
{
        if (y > x)
                x += 15;
        else
                y += 10;
}
```
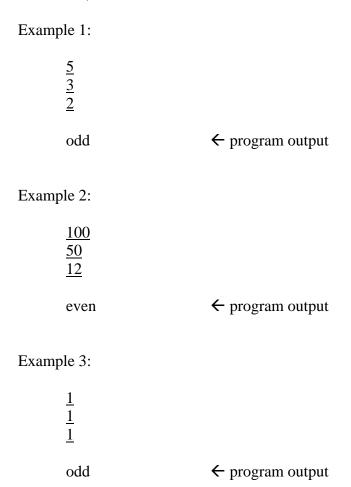
x	y
0	25
15	25
30	25
30	35
45	35
45	45
45	55
60	55

What is the final value of x?

60

Question 3 (10 marks) JAVA programming:

Write a program in JAVA that will take three (positive) integer inputs and output whether there were more even or odd inputs.

For example, your program must have output like the following (user input is underlined):

Example 1:

    5
    3
    2

    odd   ← program output

Example 2:

    100
    50
    12

    even   ← program output

Example 3:

    1
    1
    1

    odd   ← program output

Please write your program on the following page.
You may use this page for rough work, but <u>anything on this page will not be graded</u>.

```java
import java.util.*;

public class Question3
{
  public static void main (String[] args)
  {
     Scanner scan = new Scanner(System.in);

     int first = scan.nextInt();
     int second = scan.nextInt();
     int third = scan.nextInt();

     int odd = 0;
     int even = 0;

     if (first%2 == 0)
       even++;
     else
       odd++;

     if (second%2 == 0)
       even++;
     else
       odd++;

     if (third%2 == 0)
       even++;
     else
       odd++;

     if (even > odd)
       System.out.println("even");
     else
       System.out.println("odd");




  }
}
```

Question 4 (10 marks) JAVA programming:

Write a program in JAVA that will generate random numbers from 1 to 10 (inclusive) until a 10 is generated. After each number is generated, the program will output the largest number generated to that point.

For example, your program must have output like the following (note: there are no user inputs):

Example 1:

       3   ← program outputs
       6
       6
       8
       8
       8
      10

Example 2:

      10   ← program output

Example 1:

       9   ← program outputs
       9
       9
       9
       9
       9
       9
       9
       9
      10

Please write your program on the following page.
You may use this page for rough work, but <u>anything on this page will not be graded</u>.

```java
import java.util.*;

public class Question4
{
  public static void main (String[] args)
  {
     Random generator = new Random();

     int number = 1 + random.nextInt(10);
     int largest = number;

     while (largest < 10)
     {
       System.out.println(largest);
       number = 1 + generator.nextInt(10);

       if (number > largest)
          largest = number;
     }

     System.out.println(largest);




  }
}
```

Question 5 (20 marks) JAVA programming:

In a certain board game, a player landing in jail loses three turns unless they can roll a doublet – both dice have the same value. Write a program in JAVA that will simulate their dice rolls and the result.

For example, your program must have output like the following (note: there are no user inputs):

Example 1:

    Roll 1 is a 6 and a 5
    You are still in jail.
    Roll 2 is a 4 and a 4
    You are out of jail.
    Move forward 8 spaces

Example 2:

    Roll 1 is a 2 and a 1
    You are still in jail.
    Roll 2 is a 2 and a 6
    You are still in jail.
    Roll 3 is a 3 and a 4
    You are still in jail.
    Roll 4 is a 5 and a 2
    You are out of jail.
    Move forward 7 spaces

Please write your program on the following page.
You may use this page for rough work, but <u>anything on this page will not be graded</u>.

```java
import java.util.*;

public class Question5
{
  public static void main (String[] args)
  {
     Random generator = new Random();

     int die1;
     int die2;
     boolean doublet = false;
     int rolls = 0;

     do
     {
       rolls++;
       die1 = 1 + generator.nextInt(6);
       die2 = 1 + generator.nextInt(6);
       System.out.println("roll " + rolls + " is a " +
          die1 + " and a " + die2);

       if (die1 == die2)
          doublet = true;
       else if (rolls <=3)
          System.out.println("You are still in jail.");

     } while (!doublet && rolls <=3)

     System.out.println("You are out of jail.");
     System.out.println("Move forward " + (die1+die2) +
          " spaces");



  }
}
```