

York University

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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 NOT permitted.

Do not unstaple this test book – any detached sheets will be discarded. 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

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Surname: \_\_\_\_\_ First name: \_\_\_\_\_ Student #: \_\_\_\_\_

**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) && (b || (a && !d)) |  (d && a) |  !b  FALSE

Part 2 (2.5 marks):

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

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

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**Question 1b (5 marks) Designing if statements:**

A student needs six major credits to complete her degree. The available major courses next semester are

HALF4000	3 credits	on Tuesday nights
READ4100	3 credits	on Wednesday nights
FULL4300	6 credits	on Monday and Wednesday nights

In a JAVA program, there are three boolean variables – **half**, **read**, and **full**. The value of each variable is **true** if the student takes this course, and **false** otherwise.

Write an **if** statement that will set the boolean variable **graduate** to **true** if the taken courses provide at least six credits and do not have any conflicts, and to **false** if the taken courses do not have enough credits to allow her to graduate or if there is a scheduling conflict.

**Please write your answer below.**

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```
if ((half && read && !full) || (full && !read))
    graduate = true;
else
    graduate = 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 % 4 == 0)
        x += 10;
    else if (i % 5 == 1)
        x += 30;
    if (i % 3 == 0)
        x += 50;
}
```

i	x
0	10/60
1	90
2	90
3	140
4	150
5	150
6	180/230
7	230
8	240
9	290

What is the final value of x?

<b>290</b>
------------

**Part 2 (5 marks):**

```
int x = 0;
int y = 0;
while (x + y < 200)
{
    if (y > x)
        x += 20;
    else
        y += 50;
}
```

x	y
0	0
0	50
20	50
40	50
60	50
60	100
80	100
100	100

What is the final value of x?

<b>100</b>
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**Question 3 (10 marks) JAVA programming:**

Write a program in JAVA that will take two (positive) integers as input. The program will then output the largest even value, or -1 if no even value was input.

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

Example 1:

10  
5  
10    ← largest even value

Example 2:

3  
2  
2    ← largest even value

Example 3:

3  
7  
-1    ← no even values

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

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Surname:\_\_\_\_\_ First name:\_\_\_\_\_ Student #: \_\_\_\_\_

```
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 largest = -1;

        if (first%2 == 0)
            largest = first;
        if (second%2 == 0 && second > largest)
            largest = second;

        System.out.println(largest);

    }
}
```

**Question 4 (10 marks) JAVA programming:**

Write a program in JAVA that will generate integers from 1 to 10 until the sum of these numbers is at least 50, or the same number is generated twice in a row. Output all numbers and the final sum.

For example, your program must have output like the following:

Example 1:

```
5
8
1
10
4
8
5
9
50      ←    sum
```

Example 2:

```
7
4
4
15      ←    sum
```

**Please write your program on the following page.**

**You may use this page for rough work, but anything on this page will not be graded.**

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Surname:\_\_\_\_\_ First name:\_\_\_\_\_ Student #: \_\_\_\_\_

```
import java.util.*;

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

        int last = -1;
        int current = 1 + generator.nextInt(10);
        int sum = current;

        while (sum < 50 && current != last)
        {
            last = current;
            current = 1 + generator.nextInt(10);
            sum += current;
        }

        System.out.println(sum);

    }
}
```



**Question 5 (20 marks) JAVA programming:**

Write a program in JAVA that will flip coins until you guess the outcome correctly more than 50% of the time.

For example, your program must take input and have output like the following:

Example 1:

```
Heads (1) or Tails (0)?
1                               ←   user input
You guessed Heads
It was Tails
You have guessed 0 of 1

Heads (1) or Tails (0)?
0                               ←   user input
You guessed Tails
It was Tails
You have guessed 1 of 2

Heads (1) or Tails (0)?
1                               ←   user input
You guessed Heads
It was Heads
You have guessed 2 of 3

You have guessed more than half correctly
```

**Please write your program on the following page.**

**You may use this page for rough work, but anything on this page will not be graded.**

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Surname: \_\_\_\_\_ First name: \_\_\_\_\_ Student #: \_\_\_\_\_

```
import java.util.*;

public class Question5
{
    public static void main (String[] args)
    {
        Scanner scan = new Scanner (System.in);
        Random generator = new Random();

        int guesses = 0;
        int correctGuesses = 0;

        do
        {
            System.out.println("Heads or Tails");
            int guess = scan.nextInt();

            if (guess == 1)
                System.out.println("You guessed Heads");
            else if (guess == 0)
                System.out.println("You guessed Tails");

            int coin = generator.nextInt(10);

            if (coin == 1)
                System.out.println("It was Heads");
            else
                System.out.println("It was Tails");

            guesses++;
            if (guess == coin)
                correctGuesses++;

            System.out.println("You have guessed " +
                correctGuesses + " of " + guesses);
        } while (2*correctGuesses <= guesses)

        System.out.println("You have guessed more than " +
            half correctly");

    }
}
```