

COSC2081  
Programming 1  
Semester X, XXXX

Mid Term Examination- Sample

Total marks available: 60  
This exam contributes 10% to the overall  
assessment for this course.

You have 90 minutes to complete this exam,  
plus 10 minutes reading time.

This is a closed-book exam.

*Writing or using a highlighter is not allowed  
during reading time.*

No calculators, laptops, mobile phones or other electronic devices  
are allowed.

More papers are available for extra space.  
**All papers must be handed in.**

There are **THREE** sections in this exam paper.  
Attempt **ALL** sections.

Section A: 15 marks  
Section B: 15 marks  
Section C: 30 marks

This exam has 9 pages, including the cover.  
Check that your copy of the exam is complete.

<i>Student ID:</i>	<i>Student Name:</i>
<i>Date &amp; time:</i>	<i>Student Signature:</i>

**Part A: Multiple choice questions (10 marks)**

*Read the questions and enter your answer in the answer grid at the end of this section (page 5)*

1. Which one of the following is a valid declaration of a char?

- A) `char c1 = 0xbeef;`
- B) `char c2 = \u0022;`
- C) `char c3 = '\iface';`
- D) `Char c4='face';`

2. Which of the statements below is the same as the following?

```
int x = 6 * 5 % 2 - 3;
```

- A) `int x = 6 * 5 % (2 - 3);`
- B) `int x = (6 * 5) % 2 - 3;`
- C) `int x = 6 * (5 % 2) - 3;`
- D) `int x = (6 * 5) % (2 - 3);`

3. Given a and b are Boolean variables, the expression `!(a || b)` is equivalent to:

- A) `!(a && b)`
- B) `!(a | b)`
- C) `!(a ^ b)`
- D) `!a && !b`

4. Consider the following code fragment.

```
int i = 1, j = 10;
do
{
    if(i > j)
    {
        break;
    }
    j--;
} while (++i < 5);
System.out.println("i = " + i + " and j = " + j);
```

Which one of the following output is true?

- A) `i = 6 and j = 5`
- B) `i = 5 and j = 5`
- C) `i = 6 and j = 4`
- D) `i = 5 and j = 6`

5. What is alpha after the following switch statement is executed?

```
int alpha = 5;
int theta = 10;
switch (alpha-1) {
    case 4:
    case 5: theta = 3 * alpha;
    case 6: theta = alpha + 5;
    break;
    default: alpha+= 1;
}
```

- A. 5
- B. 4
- C. 6
- D. 12

6. A call to a method with a non-void return type is always a \_\_\_\_\_.

- A) method overloading
- B) method invocation
- C) **method signature**
- D) method abstraction

7. What will be the output of the code fragment below?

```
public static void main(String[] args) {
    int i, j;
    for (i = 1; i <=5; i++) {
        for (j = 1; j <=(5-i);j++) {
            System.out.print(j);
        }

        System.out.println();
    }
}
```

A) 10 121 123 1234

B) 1  
12  
123  
1234

D) 1234  
123  
12  
1

C) 1234 123 12 1

8. What will be the output of the code given below?

```
public class Test {  
    public static void main(String[] args) {  
        int n = 2;  
        xMethod(n);  
        System.out.println("n is " + n);  
    }  
  
    public static void xMethod(int n) {  
        (--n);  
    }  
}
```

- A) The code has a syntax error because xMethod() does not return a value.
- B) The code prints n is 1
- C) The code prints n is 2
- D) The code prints n is 3

9. Consider the following code

```
public class Test2 {  
    public static void main(String[] args) {  
  
        Scanner scan = new Scanner(System.in);  
        System.out.print("Enter an integer : ");  
        int x = scan.nextInt();  
        int y = 0;  
  
        while (x > 0) {  
            y = (y * 10) + x % 10;  
            x = x/10;  
        }  
        System.out.println(y);  
    }  
}
```

Assuming that the input number is a positive integer, which one of the statements below correctly describes the effect of this program. Hint: try input a number, 35 for example.

- A) The output number is formed by summing the individual digits of the input number
- B) The output number is formed by reversing the order of the individual digits in the input number
- C) The output number is a multiple of the input number
- D) The output number has no relationship to the input number

10. What is the output of the program below?

```
public class TestArrayMethod {
    public static void main(String[] args){
        int[] values = new int[5];
        passArray(values);
        for (int i = 1; i < 5; i++){
            System.out.print(values[i]+"\\t");
        }
    }
    public static void passArray(int[] x) {
        x[0]=1;
        for (int i = 1; i < 5; i++)
        {
            x[i] +=x[i-1] ;
        }
    }
}
```

- A) 1 2 1 2
- B) 1 2 3 4
- C) 0 0 0 0
- D) 1 0 1 0

### **Part A: Answers**

Circle your answers to the multiple choice questions for Part A in the table given.

Question	Choice			
1	A	B	C	D
2	A	B	C	D
3	A	B	C	D
4	A	B	C	D
5	A	B	C	D
6	A	B	C	D
7	A	B	C	D
8	A	B	C	D
9	A	B	C	D
10	A	B	C	D

**Part B: Complete the following code fragments (20 marks)**

1. **(6 marks)** Write a code fragment to declare a method to determine whether an integer is an Armstrong number or not. Use the following method header

```
public static boolean isArmstrong (int num)
```

Then write a test program that allows the user to enter an integer to determine whether it is an Armstrong number or not.

**Armstrong Number:** An Armstrong number is an  $n$ -digit number that is equal to the sum of the  $n$ th powers of its digits

For example, if your input is 371 then the output should be

```
371 is an Armstrong number: True
public static boolean isArmstrong (int num)
{
    // Write your code here.
```

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2. **(6 marks)** Given three values representing the lengths of the three sides of a triangle, determine whether the triangle is regular (all three sides are equal), symmetric (two sides are equal), or irregular (no two sides are equal).

```
public class TriangleProgram {
    public static void main(String[] args) {

        Scanner sc = new Scanner (System.in);
        double first = sc.nextDouble();
        double second = sc.nextDouble();
        double third = sc.nextDouble();
```

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3. **(8 marks)** Write a program that uses a two – dimensional array to store the highest and lowest temperatures for each month of the year. The program should output the average low, and the index of the highest temperature of the year.

```
public static void main(String[] args) {  
    double[][] temp ={ {20,7}, {25,14}, {38,26}, {40,30}, {42,33}, {35,24},  
                       {34,22}, {30,18}, {25,15}, {18,0}, {12,-5}, {8,-1} };  
    double avgHighestTemp= averageLowTemp(temp);  
    String indexHighTemp = indexHighestTemp(temp);  
    System.out.println("the average Lowest temperature:"+avgLowTemp);  
    System.out.println("the index of the Highest temperature:"+indexHighTemp);  
}  
// method to return the average of highest temperatures
```

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```
// method to return the index of Highest temperature of the year
```

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## **Part C Small application (30 marks)**

### **1. Writing an Actor class (10 marks)**

Write a class named Actor. Each Actor object has an `ID`, `name`, `filmFee` (fee to hire the actor for a film) and a `tvAppearanceFee` (fee to hire the actor for a TV show). Make sure the Actor class includes:

- a) **(2 marks)** Instance variables (data members)
- b) **(2 marks)** Two constructors:
  - 1. First constructor takes 4 arguments: `ID`, `name`, `filmFee`, `tvAppearanceFee`
  - 2. Second constructor takes only 3 arguments: `ID`, `name`, and `filmFee` (the `tvAppearanceFee` is set to 0).
- c) **(2 marks)** Accessors for all instance variables
- d) **(2 marks)** Two mutators: for `filmFee`, and `tvAppearanceFee`.
- e) **(2 marks)** A method `print()` to print the actors information in the format shown below:

`ID: e123, Name: Robert De Niro, Film Fee: 1000000, TV Appearance Fee: 0`



**2. Writing an ActorTest class (20 marks)**

- a) **(1 mark)** Declare an array that can store up to 10 **Actor** instances.
- b) **(4 marks)** Create and insert in the array 4 **Actor** instances, constructed with the information below:

ID	Name	Film Fee	TV Appearance Fee
A123	Robert De Niro	1000000	0
A124	Julia Roberts	1000000	50000
A125	Tang Thanh Ha	500000	50000
A126	Ian Holmes	250000	0

- c) **(5 marks)** Write a static method that prints a list of all Actor objects in the array. You must use a **loop**.
- d) **(10 marks)** Write a static method called **findAndPrint()**:
- Ask the user to enter a *name*.
  - Find the correct Actor instance in the array.
  - *Hint: Loop through the array until you find an instance whose name **equals to** what the user entered, using method `equals()`.*
  - If there is no Actor instance with that *name*, display an error message: "Actor not found!"
  - If there is one or more Actor instances with that *name*, print the information of the actor(s).
-