King Fahd University of Petroleum and Minerals  
College of Computer Science and Engineering  
Information and Computer Science Department  
Fall Semester (071)  
ICS 102 - Introduction to Computing I  

Major Exam 01

<table>
<thead>
<tr>
<th>Question #</th>
<th>Maximum Marks</th>
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<td>1</td>
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<td>2</td>
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~Good Luck~
Q1. [4 * 5 = 20 marks] Solve the following short answer questions:

a) Convert the following mathematical expression to java code in the slot provided.

Mathematical expression

\[ y = \left( x + \frac{5(x+1)}{10} + x + \frac{x}{4} + 5x \right) \mod 7 \]

The expression in java is:

```
y = ___________________________;  
```

b) A student was asked to write a program which prints the string “ICS102” 5 times. He wrote the following program. If there are any mistakes in his program, fix them, otherwise Just write CORRECT beside it.

```
int k=1;
do {
    System.out.println("ICS102");
k=k+1;
}while (k < 5);
```

c) A student was asked to write a program which prints the string “ICS102” 5 times. He wrote the following program. If there are any mistakes in his program, fix them; otherwise leave his program as it is.

```
int k;
for(k = 0; k <= 5; )
    System.out.println ("ICS102");
k++;
```

d) Give the value assigned to the variables first, second and third.

```
boolean first  = 3 * 6 / 9 == 10 / 2 – 3;
boolean second = 8.0 / 2 – 2 > 2 / 2 + 1.0 ;
boolean third = first && !second && true;
```

The values are:

first        = ____________  
second   = ______________  
third       = ______________

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<tr>
<th>String Class Cheat Sheet</th>
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<td>length()</td>
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<tr>
<td>compareTo(String)</td>
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<tr>
<td>compareToIgnoreCase(String)</td>
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<td>equals(String)</td>
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<tr>
<td>equalsIgnoreCase(String)</td>
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<td>toLowerCase()</td>
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<td>toUpperCase()</td>
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<th>Cont...</th>
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<tr>
<td>indexOf(String)</td>
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<td>indexOf(String, int)</td>
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<td>lastIndexOf(String)</td>
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<td>charAt(int)</td>
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<tr>
<td>substring(int)</td>
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<tr>
<td>substring(int, int)</td>
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<tr>
<td>trim()</td>
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<table>
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<th>Math Class Cheat Sheet</th>
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<tr>
<td>PI , E</td>
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<tr>
<td>pow(double, double)</td>
</tr>
<tr>
<td>abs(double)</td>
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<tr>
<td>min(double, double)</td>
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<tr>
<td>max(double, double)</td>
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<tr>
<td>round(double)</td>
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<tr>
<td>sqrt(double)</td>
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**Q2.** [8 * 5 = 40 marks] Give output for each of the following code in the space provided:

<table>
<thead>
<tr>
<th>Code</th>
<th>Output</th>
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| ```java
public class MajorExam1Q2a {
    public static void main(String[] args) {
        int x = 3, y = x / 4;
        double z = x / 2;
        System.out.println(x + " " + y + " " + z);
        System.out.println(y / (double) x);
        System.out.println(2300 % 100 / x++ + ++y);
        System.out.println(15 % 4 * 5 - 15 / 2 * 5);
        System.out.println(x + " " + y + " " + z);
    }
}
``` | |
| ```java
public class MajorExam1Q2b {
    public static void main(String[] args) {
        String exam = "I mastered Java, it's fun!";
        int n = exam.indexOf(" ", 8), a = 8, b = 7;
        System.out.println(exam.substring(n));
        System.out.println(exam.lastIndexOf("Q"));
        exam = "" + exam.charAt(25) + a + b;
        System.out.println(exam);
        System.out.println("!").equals(exam));
    }
}
``` | |
| ```java
public class MajorExam1Q2c {
    public static void main(String[] args) {
        int i, j;
        for( i = 0; i < 3; i++){
            for( j = 0; j < 4; j++){
                if(j%2 != 0)
                    System.out.print("v");
                else
                    System.out.print("^");
            }
            System.out.println();
        }
    }
}
``` | |
| ```java
public class MajorExam1Q2d {
    public static void main(String[] args) {
        int numOfTimes = 0;

        while(numOfTimes > 2)
            System.out.print("H");
        numOfTimes++;

        System.out.print("Help!");
        System.out.print(numOfTimes);
    }
}
``` | |
public class MajorExam1Q2e {
    public static void main(String[] args) {
        char grade = 'D';
        switch (grade) {
            case 'A': System.out.println("Great!");
            case 'B': System.out.println("V. Good");
            case 'C': System.out.println("Good");
                break;
            case 'D': System.out.println("Try Hard");
            case 'F': System.out.println("Poor!");
            default: System.out.println("Dropped!");
        }
    }
}

public class MajorExam1Q2f {
    public static void main(String[] args) {
        int x = 10;
        if (x < 15)
            x = x + 10;
        if (x > 15)
            x = x + 5;
        if (x > 25)
            x = x + 1;
        System.out.println(x);
    }
}

public class MajorExam1Q2g {
    public static void main(String[] args) {
        int x = 10;
        if (x > 15){
            System.out.println("Hi!");
            if (x > 1)
                System.out.println("Good day");
        }else
            System.out.println("Welcome");
    }
}

public class MajorExam1Q2h {
    public static void main(String[] args){
        for (int y = 1; y < 10; y += 5)
        {
            System.out.println("Hi!");
            for(int x = y; x >= 1; x -= 2)
                System.out.println("Major1");
            System.out.println("Bye!");
        }
    }
}
Q3. [10 marks] Write a program that does the following:
   1. Reads two strings s1 and s2.
   2. Check if s1 is inside s2 or not.
   3. If s1 is inside s2 then print “inside”. Otherwise print “not inside”.

   Hint: You can refer to the cheat sheet in page 2.

Example execution:
Enter s1:  Saleh
Enter s2:  Ahmad Saleh
The output is:
inside
Q4. [15 marks] Write a program that does the following:
   1. Reads an integer number n.
   2. Calculate sum given by the following formula:
      \[ \text{sum} = 1 + \frac{1}{2} - \frac{1}{3} + \frac{1}{4} - \frac{1}{5} \ldots \pm \frac{1}{n} \]
   3. Print sum.

Example execution:
Enter an odd integer: 3
sum = 1.6666...
Q5. [15 marks] Write a program that does the following:
1. Reads unknown number of integers with values between 0 and 20.
2. The loop should terminate if you enter a number outside the range (less than 0 or greater than 20).
3. Calculate their product.
4. Find the maximum value.
5. Print the product and the maximum.

Example execution:
Enter an integer: 5
Enter an integer: 7
Enter an integer: 25
The product = 35
The maximum = 7