KING FAHD UNIVERSITY OF PETROLEUM AND MINERALS
Information and Computer Science Department

2012/2013 First Semester (Term 121)
ICS102: Introduction to Computing (2-3-3)

MIDTERM EXAM
Tuesday, November 13th 2012, 05:30 PM – 07:00 PM
90 MINUTES

Student Information

Name:	**KEY**
ID:	

Circle your section

Al-Sukairy	SM 9:00 – 9:50 am	SM 10:00 – 10:50 am
Al-Turki	SM 8:00 – 8:50 am	SM 12:50 – 01:40 pm

Question No.	Maximum Score	Score
01	20	
02	20	
03	20	
04	20	
05	20	
TOTAL	100	

Question 1 (20 points):

Choose the correct answer in the following questions:

1. Standard code libraries in Java are called:

   a. Methods
   b. Classes
   c. Packages
   d. Statements

2. The expression **(double)(10/4)** evaluates to

   a. **2**
   b. **2.5**
   c. **2.0**
   d. **10**

3. The expression **(21/6/2.0)** evaluates to

   a. **7.0**
   b. **1.5**
   c. **7.5**
   d. **1.75**

4. The expression "x is not greater than 100 and y is not even", can be written in Java as:

   a. **x !> 100 && y%2 == 0**
   b. **x < 100 || y%2 == 0**
   c. **x >!100 && y%2 !=0**
   d. **x <= 100 && y%2 != 0**

5. The expression "x is outside the interval [-5,5]" can be written in java as:

   a. **x<-5 || x>5**
   b. **!(x<-5 || x>5)**
   c. **x!=-5 && x!=5**
   d. **x<-5 && x > 5**

6. What is required to be installed (as a minimum) in a computer to run a Java program:

   a. JDK
   b. JRE
   c. JRE and JDK
   d. JRE, JDK, and JCreator or other java IDE.

7. How many times will the string **Welcome** be displayed if the following code is run:

```
for(int k=0;k<3;k++);
     System.out.println("Welcome");
```

    a. 0
    b. 1
    c. 2
    d. 3

8. The looping mechanism that always executes at least once is:

    a. if...else
    b. do...while
    c. while
    d. for

9. Which of the following is **not** a valid Java comment?

    a. `//* This is a comment.`
    b. `\* This is a comment. *\`
    c. `//This is a comment.`
    d. `/** This is a comment */`

10. What is the output when the following code is run:

```
String str = "Time-is-precious";
str = str.substring(10, 13).toUpperCase() + str.length();
System.out.println(str);
```

    a. **EC16**
    b. **ECI15**
    c. **REC15**
    d. **ECI16**

Question 2 (20 points):

I) Consider the following Java code snippets. What will be the output for the different values of x typed by the user?

```
Scanner kb = new Scanner(System.in);
int x = kb.nextInt();
switch(x) {
      case 1: x=x+1;
          break;
      case 3: x=x+2;
      case 5: if(x==4)
          x=x+6;
      case 6: x=x+3;
          break;
      default : x=x-1;
}
System.out.print(x);
```

User Input	Program Output
1	2
2	1
3	8
5	8
6	9

II) Find the output of the following Java code snippets:

a.

```
int i = 3, j;
do{
    for(j=i; j<5; j++)
        System.out.println(i*j);
    ++i;
} while(i<8);
```

OUTPUT

```
9
12
16
```

b.

```
String s1 = "abc";
String s2 = new String("abc");
if(s1 == s2)
    System.out.println(1);
else
    System.out.println(2);
if(s1.equals(s2))
    System.out.println(3);
else
    System.out.println(4);
```

OUTPUT

```
2
3
```

Question 3: (20 points)

Write a Java program that determines how much to pay an hourly employee, based on the hourly rate **r**, and the total number of hours worked **n**. The program reads both **r** and **n** from the user, and calculates the amount to be paid according to the following table:

Number of hours	Pay (Riyals)
$0 < n \leq 20$	$n \times r$
$20 < n \leq 30$	$20 \times r + (n - 20) \times (1.2 \times r)$
$30 < n \leq 40$	$32 \times r + (n - 30) \times (1.5 \times r)$

The program should then print to the screen the computed value.

Note: If n is negative or greater than 40, or if r is negative or greater than 50.0, the program should print an error message.

```java
import java.util.Scanner;

class MQ3 {
    public static void main(String[] args) {
        Scanner kb = new Scanner(System.in);
        System.out.print("Enter the number of hours: ");
        int n = kb.nextInt();
        System.out.print("Enter the hourly rate: ");
        double r = kb.nextDouble();
        if (n < 0 || n > 40 || r < 0 || r > 50.0) {
            System.out.println("Invalid input.");
            System.exit(0);
        }
        double pay = 0;
        if (n <= 20)
            pay = n * r;
        else if (n <= 30)
            pay = 20 * r + (n - 20) * (1.2 * r);
        else
            pay = 32 * r + (n - 30) * (1.5 * r);
        System.out.println("The amount to be paid is " + pay);
    }
}
```

Question 4: (20 points)

If we start with two different positive integers **a** and **b** and repeatedly replace the larger value by their absolute difference, stopping when both numbers are the same, this final value is the greatest common divisor (GCD) of the two original numbers.

For example, if **a** is 12 and **b** is 8, then:
    Step 1: 12 and 8   → replace 12 with |12 – 8|, so now we have 4 and 8
    Step 2: 4 and 8   → replace 8 with |4 – 8|, so now we have 4 and 4
    Step 3: 4 and 4   → they are the same so we stop, and the result is 4

Write a complete Java program that reads two positive integers and then it prints out their GCD.

```java
import java.util.Scanner;

class MQ4 {
    public static void main(String[] args) {
        Scanner kb = new Scanner(System.in);
        System.out.print("Enter two positive integers: ");
        int a = kb.nextInt();
        int b = kb.nextInt();
        if (a < 0 || b < 0) {        // optional input validation
          System.out.println("Invalid input.");
          System.exit(0);
        }
        while(a != b)
          if (a > b)
                a = a - b;
          else
                b = b - a;
        System.out.println("The GCD is " + a);
    }
}
```

Question 5: (20 points)

Write a Java program that reads in a text file "input.txt" and prints to the screen the total number of vowels in the file. (A vowel is one of the letters {a, e, i, o, u})

For example, if the input file had the text:

```
This is just an example
text file. Bye.
```

The program should print out the value 11.

```java
import java.util.Scanner;
import java.io.FileInputStream;
import java.io.FileNotFoundException;

class MQ5 {
   public static void main(String[] args) throws FileNotFoundException {
        Scanner input = new Scanner(new FileInputStream("input.txt"));
        String word;
        int count = 0;
        char c;
        while(input.hasNext()) {
            word = input.next().toLowerCase();
            for(int i = 0; i < word.length(); i++) {
                c = word.charAt(i);
                if (c == 'a' || c == 'e' ||
                    c == 'i' || c == 'o' ||
                    c == 'u')
                   count++;
            }
        }
        System.out.println("There are " + count + " vowel(s).");
        input.close();
   }
}
```