## Question 1: [5 marks]

Write a method that counts the occurrences of each element in a list of integers using the following header:

public static void countOccurrence(int[] array)

Write a test program that prompts the user to enter a list of integer numbers and invokes this method to display the count of occurrences of each number. Here is a sample run of the program:

```
Enter the list size: 10

Enter 10 integers: 2  5  6  5  4  3  6  7  2  5

2  occurs  2  times

5  occurs  3  times

6  occurs  2  times

4  occurs  1  time

3  occurs  1  time

7  occurs  1  times
```

Note if a number occurs more than one time, the plural word "times" is used in the output.

## Question 2: [5 marks]

A class called InvoiceItem, which models an item of an invoice is designed as shown in the following class diagram. Write the InvoiceItem class.

| InvoiceItem |
|---|
| -id:String<br>-desc:String<br>-qty:int<br>-unitPrice:double |
| +InvoiceItem(id:String, desc:String, qty:int, unitPrice:double)<br>+getID():String<br>+getDesc():String<br>+getQty():int<br>+getUnitPrice():double<br>+setQty(qty:int):void<br>+setUnitPrice(unitPrice:double):void<br>+getTotal():double<br>+toString():String |

*Note:*

- You must perform all the input validations, for example the qty cannot be zero or negative number.
- The method getTotal() returns qty multiplied by unitPrice.
- The method toString() will print the invoice details including the total price.
- Write a test program that creates an object from the InvoiceItem class and prints the item details.

## Question 3: [8 marks]

What is the output of the following code snippet?

[1]

```java
public static int fun(int x){
    int returnValue = 0;
    if (x > 5){
        returnValue = x;
    }
    else{
        returnValue = fun(2 * x);
    }
    return returnValue;
}
public static void main(String[] args){
    System.out.println("fun(2) = " + fun(2));
}
```

[2]

```java
double[] myList = {1, 5, 5, 5, 5, 1};
double max = myList[0];
int indexOfMax = 0;
for (int i = 1; i < myList.length; i++) {
    if (myList[i] >= max) {
        max = myList[i];
        indexOfMax = i;
    }
}
System.out.println(indexOfMax);
```

**[3]**

```
public class Test {
  public static void main(String[] args) {
    int[] x = {1, 2, 3, 4, 5};
    increase(x);

    int[] y = {1, 2, 3, 4, 5};
    increase(y[0]);

    System.out.println(x[0] + " " + y[0]);
  }

  public static void increase(int[] x) {
    for (int i = 0; i < x.length; i++)
      x[i]++;
  }
  public static void increase(int y) {
    y++;
  }
}
```

**[4]** What is the output of the second println statement in the main method?

```
public class Foo {
  int i;
  static int s;

  public static void main(String[] args) {
    Foo f1 = new Foo();
    System.out.println("f1.i is " + f1.i + " f1.s is " + f1.s);
    Foo f2 = new Foo();
    System.out.println("f2.i is " + f2.i + " f2.s is " + f2.s);
    Foo f3 = new Foo();
    System.out.println("f3.i is " + f3.i + " f3.s is " + f3.s);
  }
  public Foo() {
    i++;
    s++;
  }
}
```

## Question 4: [2 marks]

Given the following method, what is the output of the call nPrint('a', 4)?

```
static void nPrint(String message, int n) {
  while (n > 0) {
    System.out.print(message);
    n--;
  }
}
```

- ○ A. aaaaa
- ○ B. aaaa
- ○ C. aaa
- ○ D. invalid call

Which of the following statements are valid?

- ☐ A. int i = new int(30); ✗
- ☐ B. double d[] = new double[30]; ✓
- ☐ C. int[] i = {3, 4, 3, 2}; ✓
- ☐ D. char[] c = new char(); ✗
- ☐ E. char[] c = new char[4]{'a', 'b', 'c', 'd'};

*Best Wishes*
*DR. Noha Yehia*