TK1114 Tutorial 8

Section A

Trace the code segments **using pen and paper** to print the output.
Note: Do not run the code segment using Eclipse or any other IDE. This task is to ensure you acquired strong understanding on the basic concept and program flow of static methods.

1. Given the following program:

```
1  import java.util.*;
2  public class MarkToGrade2 {
3
4     public static char toGrade(int mark) {
5        char grade;
6
7        if (mark >= 80)
8           grade = 'A';
9        else if (mark >= 70)
10          grade = 'B';
11       else if (mark >= 60)
12          grade = 'C';
13       else if (mark >= 50)
14          grade = 'D';
15       else
16          grade = 'E';
17
18       return grade;
19    }
20
21    public static void main(String [] args) {
22       Scanner sc = new Scanner(System.in);
23
24       int mark;
25       char grade;
26
27       mark = sc.nextInt();
28       grade = toGrade(mark);
29       System.out.println(grade);
30    }
31 }
```

a) The above program is being modified from previous tutorial question to show the usage of static method. Identify from which tutorial and which question.

b) Identify the ***formal parameter*** and ***actual parameter***.

c) Note the declaration for variable `mark` in line 4 and line 24. Can we have two variables with same name in one program?

d) Discuss the scope of variable `mark` in (c).

d) Discuss the scope of variable `grade` in line 5 and line 25.

2. Given the following program:

```
1  import java.util.*;
2
3  public class Harmonic {
4
5      public static double harmonic(int n) {
6          double sum = 0.0;
7          for (int i = 1; i <= n; i++) {
8              sum += 1.0 / i;
9          }
10         return sum;
11     }
12
13     public static void main(String[] args) {
14
15       Scanner sc = new Scanner(System.in);
16       int N = sc.nextInt();
17
18          for (int i = 0; i < N; i++) {
19              int arg = sc.nextInt();
20
21              double value = harmonic(arg);
22              System.out.println(value);
23          }
24     }
25 }
```

a) Trace the program with following data set.

```
5
2
5
1
0
10
```

b) Discuss what the program does.

Section B

1. Given the following declaration:

```
Scanner sc = new Scanner(System.in);
String str = sc.nextLine();
String str2 = new String();
```

Write code segments for the following tasks.

a) Print the length of the inputted string.

b) Convert all characters in `str` to uppercase.

c) Count the total number of vowels in `str`.

d) Count the total number of consonants in `str`.

e) Count the total number of digits in `str`.

f) Count the number of blank spaces in `str`.

g) Replace all character `'a'` in `str` to `'*'` and store the new string in `str2`.

h) Remove all vowels in `str` and store the new string in `str2`.

2. Complete the following code segments:

a)

```
public static double calculateArea(double radius) {
   // return area of a circle
   ...
}
```

b)

```
public static double toCelcius(double fahrenheit) {
   // convert tempreture from Fahrenheit to Celcius
   ...
}
```

c)

```
public static int toSecond(int hour, int min, int sec) {
   // convert time to second
   ...
}
```

d)

```
public static String getMonthName(int month) {
   // return the month name for month
   //  e.g. if month is 1, return "January"
   ...
}
```

e)

```
public static int calculateSum(int [] data) {
   // calculate and return the sum of the integers
   // in the array
   ...
}
```

f)

```
public static int getHighest(int [] data) {
   // determine and return the highest value in the array
   ...
}
```

Section C: Problem Solving

Discuss the solution for the following problems:

1. Secret Message – from PCComp 2014
2. ISBN-10 Check digit – from PCComp 2016
3. Is it the same? – from ACMICPC 2014