Introductory programming and problem solving
Week 3 workshop
Naomi Thing

Group A

1. A do-while loop is executed:

   At least once
   At least twice
   At most once

= At least once.

2. What can be done using one type of loop can also be done using the other two types of loops, True or False? Justify your answer.

= Using the other two types of loops, one type of loop can be done because to execute loop we need condition. As long as condition matches according to the output we get, all the loops can be used to do same things.

3. Write an equivalent while () loop for the following for () loop

```
int s=0;
for(int x=1; x<=25; x+=2)
s+=x;
```

Group B

1. Write a program to print numbers from 1 to 10

```
import  java.util.*;
public class printnumber{
    public static void main(String[] args){
        int n=10;
        for(int i=1; i<=n; ++i){
            System.out.println(i);
    }
}
}
```

Output:

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```
1
2
3
4
5
6
7
8
9
10
```

2. Write a program to calculate the sum of first 10 natural number.

```
import java.util.Scanner;
public class sumofnaturalnum{
    public static void main(String[] args){
        Scanner sc=new Scanner(System.in);
        System.out.print("enter any number");//take number from user//
        int num=sc.nextInt();
        int sum=0;
        for (int i=1;i<=num;++i){
            sum+=i;
        }
        System.out.println("the sum of first 10 natural numbers is "+sum);
    }
}
```

Output:

```
enter any number6
the sum of first 10 natural numbers is 21
```

3. Write a program that prompts the user to input a positive integer. It should then print the multiplication table of that number.

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```
import java.util.Scanner;
public class positiveinteger{
    public static void main(String[] args){
        Scanner sc=new Scanner(System.in);
        System.out.print("enter a number");
        int num=sc.nextInt();
        for(int i=1;i<=10;++i){
            System.out.printf("%d * %d = %d \n", num, i, num*i);
        }
    }
}
```

Output:

```
enter a number2
2 * 1 = 2
2 * 2 = 4
2 * 3 = 6
2 * 4 = 8
2 * 5 = 10
2 * 6 = 12
2 * 7 = 14
2 * 8 = 16
2 * 9 = 18
2 * 10 = 20
```

4. Write a program to find the factorial value of any number entered through the keyboard.

```
import java.util.Scanner;
public class factorial{
    public static void main(String[] args){
        Scanner sc=new Scanner(System.in);
        System.out.print("enter any number");
        int a, n=sc.nextInt();
        int i=1;
        for(a=1; a<=n; a++){
            i=i*a;

        }System.out.print(i);
    }
}
```

Output:

```
enter any number3
6
```

5. Two numbers are entered through the keyboard. Write a program to find the value of one number raised to the power of another. (Do not use Java built-in method) [Home Task]

```
import java.util.Scanner;
public class powerofanother{
    public static void main(String[] args){
        Scanner sc=new Scanner(System.in);
        System.out.println("enter the value 'w'");
        int w=sc.nextInt();
        System.out.println("enter the value'a'");
        int a=sc.nextInt();
        System.out.println("choose the value'w' or 'a'to power up");
        int o=sc.nextInt();
        System.out.println("the power is \n " +(o*o));
    }
}
```

Output:

```
enter the value 'w'
2
enter the value'a'
2
choose the value'w' or 'a'to power up
2
the power is
 4
```

6. Write a program to enter the numbers till the user wants and at the end it should display the count of positive, negative and zeros entered.

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```
public class pnandz{
    public static void main(String[] args){
        int number, cP=0, cN=0, cZ=0;//cP=count positive, cN=count negative,cZ=count zero//
        char choose;
        Scanner count=new Scanner(System.in);
        do{
            System.out.print("enter the number");
            number=count.nextInt();
            if(number>0){
                cP++;}
                else if(number<0){
                    cN++;}
                    else{
                        cZ++;}
                    System.out.print("do you want to continue? y/n?");
                    choose=count.next().charAt(0);
                }while(choose=='y' || choose=='Y');
                System.out.println("positive numbers: "+cP);
                System.out.println("negative numbers: "+cN);
                System.out.println("zero numbers: "+cZ);
            }
        }
```

Output:

```
enter the number2
do you want to continue? y/n?y
enter the number4
do you want to continue? y/n?n
positive numbers: 2
negative numbers: 0
zero numbers: 0
```

7. Write a program to print Fibonacci series of n terms where n is input by user:
   0 1 1 2 3 5 8 13 24 ....

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```java
import java.util.Scanner;
public class fiboseries{
    public static void main(String[] args){
    Scanner sc=new Scanner(System.in);
    System.out.print("enter a number");
    int n1=0, n2=1, n3, i, count=sc.nextInt();
    System.out.print(n1+" "+n2);
    for (i=2;i<count;++i){
        n3=n1+n2;
        System.out.print(""+n3);
        n1=n2;
        n2=n3;
    }
}
}
```

Output:

```
enter a number12
0 1123581321345589
```

8. Write a program to print following:

I)
```
*
***
*****
*******
*********
```

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```java
import java.util.Scanner;
public class starpyramid{
    public static void main(String[] args){
        Scanner sc=new Scanner(System.in);
        System.out.println("enter number of rows");
        int rows=sc.nextInt();
        for (int i=1; i<=rows; i++){
            for (int j=1; j<= rows-i; j++){
                System.out.print(" ");
            }for (int k=1; k<=(i*2)-1; k++){
                System.out.print("*");
            }
            System.out.println();
    }
}
}
```

Output:

```
enter number of rows
5
    *
   ***
  *****
 *******
*********
```

ii) 1
222
33333
4444444
555555555

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```java
import java.util.Scanner;
public class numpyramid{
    public static void main(String[] args){
    Scanner sc=new Scanner(System.in);
    System.out.println("enter number of rows");
    int rows=sc.nextInt();
    for(int i = 1; i <= rows; i++) {
        for (int j = 1; j <= rows-i; j++) {
            System.out.print(" ");
        }for (int k = 1; k <= (i*2)-1; k++) {
            System.out.print(i);
        }
        System.out.println();
    }
}
}
```

Output:

```
enter number of rows
5
    1
   222
  33333
 4444444
555555555
```

iii) 1

212
32123
4321234
543212345

[Home Task]

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```java
import java.util.Scanner;
public class secnumpyramid{
    public static void  main(String[] args){
        int rows=5, k=0, c=0, c1=0;//c=count and c1=count1//
        for(int i=1;i<=rows; ++i){
            for(int space=1; space<=rows-i;++space){
                System.out.print("");
                ++c;
            }
            while(k !=2*i-1){
                if (c <=rows-1){
                    System.out.print((i -k)+"");
                    ++c;
                }else{
                    ++c1;
                    System.out.print((i-k +2*c1)+"");
                }
                ++k;
            }
            c1=c=k=0;
            System.out.println();
        }
    }
```

Output:

```
1
212
32123
4321234
543212345
```

Group C

1. Write a program that:

(a) Uses a loop to add up all the even numbers between 100 and 200, inclusive. Sums a series of (positive) integers entered by the user, excluding all numbers that are Greater than 100.

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```java
import java.util.Scanner;
public class proga{
    public static void main(String[] args){
        int even=0, num=1, proga;
        Scanner sc=new Scanner(System.in);
        for(int i=100; i<=200; i+=2){
            even=even+i;
        }
        while (num>0){
            System.out.println("enter a positive number ");
            num=sc.nextInt();
            if (num>0&&num<=100){
                even=even+num;
            }
        }
        System.out.println("sum of number is "+ even);
    }
}
```

Output:

```
enter a positive number
5
enter a positive number
5
enter a positive number
5
enter a positive number
5
enter a positive number
-10
sum of number is 7670
```

(c) Solves (a) but this time using an infinite loop, break and continue statements.

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```java
import java.util.Scanner;
public class progc{
    public static void main(String[] args){
        int even=0, num=1, progc;
        Scanner sc=new Scanner(System.in);
        while (num>0){


        for(int i = 100; i <= 200; i+=2){
            even=even + i;
        }

        while (num>0){
            System.out.println("enter a positive number ");
            num=sc.nextInt();
            if (num > 0 && num <= 100){
                even=even+num;
            }
        }
        System.out.println("sum of number is "+ even);
    }
}
}
```

Output:

```
enter a positive number
4
enter a positive number
3
enter a positive number
2
enter a positive number
-1
sum of number is 7659
```

(d) Prompts the user to enter any number of positive and negative integer values, then
Displays the number of each type that were entered. [Home Task]

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```java
import java.util.Scanner;
public class progd{
    public static void main(String[] args){
        int pos=0, neg=0, num=1;
        Scanner sc=new Scanner(System.in);
        while (num!=0){
           System.out.println("enter positive or negative number");
        num=sc.nextInt();
            if (num > 0 ){
                pos++;
            }
            if(num<0){
                neg++;
            }
        }
        System.out.println("positive number "+pos);
        System.out.println("negative number "+neg);
    }
}
```

Output:

```
enter positive or negative number
2
enter positive or negative number
3
enter positive or negative number
4
enter positive or negative number
5
enter positive or negative number
6
enter positive or negative number
-6
enter positive or negative number
-1
enter positive or negative number
0
positive number 5
negative number 2
```

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2. The following while loop is meant to multiply a series of integers input by the user, until a sentinel value of 0 is entered. Indicate any errors in the code given. See if you can fix the program and get it running.

```
public class Main {
public static void main (String[] args) {
int num;
int product = 1;
String a = System.console().readLine("Enter first number");
num = Integer.parseInt(a);
while (num != 0) {
a = System.console().readLine("Enter first number");
num = Integer.parseInt(a);
product = product * num;
}
System.out.printf("product = %d", product);
}
}
```

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```java
import java.util.Scanner;
public class fixing{
    public static void main(String[] args){
        int num;
        int product=1;
        Scanner sc=new Scanner(System.in);
        System.out.print("enter first number");
        String n=sc.next();
        num=Integer.parseInt(n);
        while (num!=0){
            System.out.print("enter first number");
            n=sc.next();
            num=Integer.parseInt(n);
            product=product*num;
        }
        System.out.printf("product=%d", product);
    }
}
```

Output:

```
enter first number2
enter first number
2
enter first number2
enter first number2
enter first number2
enter first number2
enter first number2
enter first number2
enter first number2
enter first number2
enter first number2
enter first number0
product=0
```

3. For each of the following, indicate which a definite loop is, and which an indefinite loop, Explain your reasoning.

(a)

```
public class Main {
public static void main(String[] args) {
int num;
String a = System.console().readLine("Enter a non-zero
value:"); num = Integer.parseInt(a);
while (num == 0) {
a = System.console().readLine("Enter a non-zero value:");
num = Integer.parseInt(a);
}
}
}
```

= Indefinite loop

(b)

```
public class Main {
public static void main(String[] args) {
int n = 0;
while (n < 10){
System.out.printf("%f\n", Math.pow(2, n));
n = n + 1;
}
}
}
```

= Definite loop

Group D

1. Write a program that determines how many of each coin a vending machine should dispense for
Different amounts of change. You should print a row for each value of change between 0 and 99 and

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Columns for the change required. [Home Task]

For example, the start of the table should look like the

following:

Change	50p	20p	10p	5p	2p	1p
0	0	0	0	0	0	0
1	0	0	0	0	0	1
2	0	0	0	0	1	0
3	0	0	0	0	1	1
4	0	0	0	0	2	0
5	0	0	0	1	0	0

```java
import java.util.Scanner;
public class coininvendingmachine{
    public static void main(String[] args){
        int penny=1, nickel=5, dime=10, quarter=25; // p for penny, n for nickel, d for dime, q for quarter
        System.out.println("change | penny | nickel | dime | quarter");
        for(int change=0; change <=99; change++){
            int ps= change/penny;
            int ns= change/nickel;
            int ds= change/dime;
            int qs= change/quarter;
            //print a row for the current value of change.
            System.out.printf("%6d | %7d |%7d | %4d | %6d\n", change, ps, ns, ds, qs);
        }
    }
}
```

Output:

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change	penny	nickel	dime	quarter
0	0	0	0	0
1	1	0	0	0
2	2	0	0	0
3	3	0	0	0
4	4	0	0	0
5	5	1	0	0
6	6	1	0	0
7	7	1	0	0
8	8	1	0	0
9	9	1	0	0
10	10	2	1	0
11	11	2	1	0
12	12	2	1	0
13	13	2	1	0
14	14	2	1	0
15	15	3	1	0
16	16	3	1	0
17	17	3	1	0
18	18	3	1	0
19	19	3	1	0
20	20	4	2	0
21	21	4	2	0
22	22	4	2	0
23	23	4	2	0
24	24	4	2	0
25	25	5	2	1

2. Write a program to compute the cosine of x. The user should supply x and a positive integer n. We compute the cosine of x using the series and the computation should use all terms in the series up through the term involving x^n cos x = 1 - x^2/2! + x^4/4! - x^6/6! ..... [Home Task]s