LAB. ASSIGNMENT-5

Question 1: Amicable numbers are pair of numbers each of whose divisors are added to give the pair of other no. Write a program that tests whether a given pair of no.s is amicable no.s or not.

Ex:- Input 1: 220
Input 2: 284

Proper divisor of 220 are 1, 2, 4, 5, 10, 11, 20, 22, 44, 55, and 110 who sum is 284. and proper divisor of 284 are 1, 2, 4, 71, 142 whose sum is 220.

Ans.

```
import java.util.*;
public class Q1
{
  public static void main (String[] args)
  {
    Scanner sc=new Scanner (System.in);
    System.out.print ("Enter first number: ");
    int a=sc.nextInt();
    System.out.print("Enter second number: ");
    int b=sc.nextInt();
    int s1=0, s2=0;
    for (int i=1; i<a; i++)
    {
      if (a%i==0)
        s1+=i;
    }
    for (int j=1; j<b; j++)
    {
      if (b%j==0)
        s2+=j;
    }
    if (s1==b && s2==a)
```

```
        System.out.println(a+" and "+b+" are amicable
        numbers");
    else
        System.out.println(a+" and "+b+" are not
        amicable numbers");
    }
}
```

Output :

```
Enter first number : 220
Enter second number: 284
220 and 284 are amicable numbers.
```

Question 2: WAP to check whether a no. is twisted prime or not. A twisted prime is a number if the number and its reverse both are prime.

Ans.
```
import java.util.*;
public class Q2
{
  public static void main(String[] args)
  {
    Scanner sc = new Scanner(System.in);
    System.out.print("Enter a number: ");
    int n = sc.nextInt();
    int n1 = n, rev = 0;
    while (n1 != 0)
    {
      int r = n1 % 10;
      rev = rev * 10 + r;
      n1 /= 10;
    }
    int cn = 0, cr = 0;
    for (int i = 2; i < n; i++)
    {
      if (n % i == 0)
      {
        cn++;
      }
    }
    for (int j = 2; j < rev; j++)
    {
      if (rev % j == 0)
      {
        cr++;
      }
    }
```

```
        if (cn==0 && cr==0)
            System.out.println(n + " is a twisted prime");
        else
            System.out.println(n + "is not a twisted prime");
        sc.close();
    }
}
```

Output:

```
Enter a number : 97
97 is a twisted prime.
```

Question 3: WAP to enter 1st no. and 2nd no. Display all the prime no.s between first and 2nd no.

Ans.
```
import java.util.*;
public class Q3
{
  public static void main(String[] args)
  {
    Scanner sc = new Scanner(System.in);
    int a, b, count=0;
    System.out.print("Enter the first number: ");
    a=sc.nextInt();
    System.out.print("Enter the second number: ");
    b=sc.nextInt();
    System.out.print("Prime no.s between" + a + "
    and " + b + " are:");
    for (int i=a; i<=b; i++)
    {
      int count=0;
      for (int j=2; j<i; j++)
      {
        if (i%j==0)
        {
          count+=1;
        }
      }
      if (count==0)
        System.out.print(i + " ");
    }
    sc.close();
  }
}
```

Output:

```
Enter the first number : 4
Enter the second number : 15
Prime numbers between 4 and 15 are: 5 7 11 13
```

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Question 4: WAP to calculate and display the factorial of all the no's between m and n (where $m < n$, $m > 0, n > 0$)

Ans.

```
import java.util.*;
public class Q4
{
  public static void main(String[] args)
  {
    Scanner sc = new Scanner(System.in);
    System.out.print("Enter the value of m : ");
    int m = sc.nextInt();
    System.out.print("Enter the value of n : ");
    int n = sc.nextInt();
    int fact = 1;
    for(int i=m; i<=n; i++)
    {
      int fact = 1;
      for(int j=1; j<=i; j++)
      {
        fact *= j;
      }
      System.out.println("Factorial of "+m+" is "+fact);
    }
  }
}
```

Output:

```
Enter the value of m=2
Enter the value of n=4
Factorial of 2 is 2
Factorial of 3 = 6
Factorial of 4 = 24
```

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Question 5: WAP to display the multiplication table from 2 to 15.

Ans.
```
import java.util.*;
public class Q5
{
  public static void main (String[] args)
  {
    for (int i = 2; i<=15; i++)
    {
      System.out.println("Multiplication table of "+i);
      for (int j=1; j<=10; j++)
      {
        System.out.println(i+"x"+j+"="+(i*j));
      }
    }
  }
}
```

Output:

```
Multiplication table of 2
2x1=2
2x2=4
.
.
.
Multiplication table of 15
15x1=15
15x2=30
15x3=45
.
.
.
```

Question 6 : WAP to print the following outputs using for loop.

```
*
* *
* * *
* * * *
* * * * *
```

Ans.

```
public class Q6a
{
  public static void main(String[] args)
  {
    for (int i=1; i<=5; i++)
    {
      for (int j=1; j<=i; j++)
      {
        System.out.print("* ");
      }
      System.out.print("\n");
    }
  }
}
```

b)

```
1
2 2
3 3 3
4 4 4 4
5 5 5 5 5
```

Ans.

```
public class Q6b
{
  public static void main (String[] args)
  {
    for (int i=1; i<=5; i++)
    {
      for (int j=1; j<=i; j++)
      {
        System.out.print(i);
      }
      System.out.print("\n");
    }
  }
}
```

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e)
```
1
2 3
4 5 6
7 8 9 10
11 12 13 14 15
```

Ans.
```
public class Q6e
{
  public static void main(String[] args)
  { int k=1;
    for (int i=1; i<=5; i++)
    {
      System.out.print(k=k+1);
    }
    System.out.println();
  }
}
```

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d)
```
1
1 2
1 2 3
1 2 3 4
1 2 3 4 5
```

Ans.
```
public class Q6d
{
  public static void main (String[] args)
  {
    for (int i=1; i<=5; i++)
    {
      for (int j=1; j<=i; j++)
      {
        System.out.print(j);
      }
      System.out.println();
    }
  }
}
```

Question 7: WAP to print following pattern.

```
A
A B
A B C
A B C D
A B C D E
```

Ans

```
public class Q7a
{
  public static void main (String[] args)
  {
    for (int i = 'A'; i <= 'E'; i++)
    {
      for (int j = 'A'; j <= i; j++)
      {
        System.out.print(j + " ");
      }
      System.out.println();
    }
  }
}
```

b)
```
$ $ $ $ $
$ $ $ $
$ $ $
$ $
$
```

Ans.
```
public class Q7b
{
  public static void main(String[] args)
  {
    for (int i=5; i>=1; i--)
    {
      for(int j=1; j<=i; j++)
      {
        System.out.print("$");
      }
      System.out.println();
    }
  }
}
```

e)

```
    1
  2 2
3 3 3
4 4 4 4
5 5 5 5 5
```

Ans

```
import java.util.*;
public class Q7e
{
  public static void main (String[] args)
  {
    Scanner sc = new Scanner(System.in);
    for (int i=1; i<=5; i++)
    {
      for (int j=1; j<=(5-i); j++)
      {
        System.out.print(" ");
      }
      for (int k=1; k<=i; k++)
      {
        System.out.print(i);
      }
      System.out.println();
    }
  }
}
```

Question 8: WAP to enter the value of n and display the sum of the following series.

$1 + (1+2) + (1+2+3) + \ldots + (1+2+3+4+\ldots+n)$

Ans.

```
import java.util.*;
public class Q8
{
  public static void main (String[] args)
  {
    Scanner sc = new Scanner (System.in);
    System.out.print("Enter n: ");
    int n = sc.nextInt();
    int sum = 0;
    for (int i=1 ; i<=n; i++)
    {
      for (int j=1; j<=i ; j++)
      {
        s+=j;
      }
    }
    System.out.println(sum);
    sc.close();
  }
}
```

Output:

```
Enter n: 3
10
```

Question 9: WAP that will read the value of n from the user and calculate the sum of the following series.

$$\frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + \frac{1}{4^2} + \cdots + \frac{1}{n^2}$$

Ans.

```
import java.util.*;
public class Q9
{
  public static void main (String[] args)
  {
    Scanner sc = new Scanner( System.in);
    System.out.print("Enter n:");
    int n = sc.nextInt();
    int sum = 0;
    for (int i=1; i<=n ; i++)
    {
      sum += (1.0/(i*i));
    }
    System.out.print(sum);
    sc.close();
  }
}
```

Output:

```
Enter n: 2
Sum of the series is 1.25
```

Question 10: Given a=0, b=1, c=1 are the first three no. of some sequence. All other numbers in the sequence are generated from the sum of their three most recent predecessors. Write a java program to generate this sequence upto n terms where n>3.

Ans.

```
import java.util.*;
public class Q10
{
  public static void main(String[] args)
  {
    Scanner sc= new Scanner(System.in);
    System.out.print("Enter no. of terms: ");
    int n=sc.nextInt();
    int a=0,b=1, c=1, next;
    System.out.print(a+" "+b+" "+c);
   for(int i=4; i<=n; i++)
   {
     next=a+b+c;
     System.out.print(" "+next);
     a=b;
     b=c;
     c=next;
   }
   sc.close();
  }
}
```

Output:

```
Enter the no. of terms: 6
0 1 1 2 4 7
```

HOME ASSIGNMENT-5

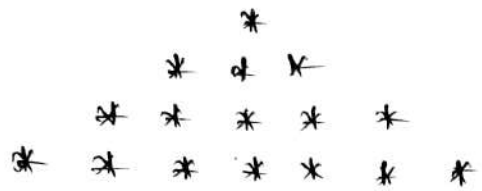
Question1. Write a program to print the followings pattern.

```
5 4 3 2 *
5 4 3 * 1
5 4 * 2 1
5 * 3 2 1
* 4 3 2 1
```

Ans.

```
public class HQ1
{
  public static void main( String[] args)
  {
    for (int i=1; i<=5; i++)
    {
      for (int j=5; j>=1; j--)
      {
        if (i==j)
        {
          System.out.print("*" + " ");
        }
        else
        {
          System.out.print( j + " ");
        }
      }
      System.out.print ("\n");
    }
  }
}
```

Question 2 : Write a program to print the following pattern.



Ans.

```
public class HQ2
{
  public static void main( String[] args)
  {
    for (int i=1; i<=4; i++)
    {
      for (int j= 4; j>=i; j--)
      {
        System.out.print(" ");
      }
      for (int k=1; k<=(2*i-1); k++)
      {
        System.out.print("*");
      }
      System.out.println();
    }
  }
}
```

Question 3: Write a program to evaluate sin x as defined by infinite series expansion.

$$\sin(x) = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \cdots$$

The acceptable error for computation is 10^{-6}.

Ans.
```
import java.util.*;
public class HQ3
{
  public static void main(String[] args)
  {
    Scanner sc = new Scanner(System.in);
    double x = sc.nextDouble();
    double error = 0.000001
    double term = x;
    double sum = x;
    int i = 1;
    while (Math.abs(term) > error)
    {
      i+=2;
      term = - term *((x*x) / (i*(i-1)));
      sum += term;
    }
    System.out.println(sum);
  }
}
```

Question 4: WAP to evaluate the function cos(x) defined by the infinite series of expansion.

$$\cos(x) = 1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \frac{x^6}{6!} + \cdots$$

The acceptable error for computation is 10^{-6}.

Ans

```
import java.util.*;
public class Q4
{
  public static void main(String[] args)
  {
    Scanner sc = new Scanner(System.in);
    System.out.println("Enter x: ");
    double x = sc.nextDouble();
    double error = 0.000001;
    double term = x;
    double sum = 1.0;
    int i = 2;
    while (Math.abs(term) > error)
    {
      term = -term * (x*x) / ((i-1) * i);
      sum += term;
      i += 2;
    }
    System.out.println(sum);
  }
}
```

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Question 5, Write a program to generate and print the first n terms of Fibonacci series where n >= 1.

Ans.

```
import java.util.*;
public class HQ5
{
  public static void main (String[] args)
  {
    Scanner sc= new Scanner (System.in);
    System.out.print(" Enter n : ");
    int n= sc.nextInt();
    int a= 0, b= 1;
    int count=1;
    while (count<=n)
    {
      System.out.print(a+" ");
      int next= a+b;
      a=b;
      b=next;
      count+=1;
    }
    sc.close();
  }
}
```