1.	Amicable numbers are pair of numbers each of whose divisors are added to give the other number. **Example:** The smallest pair of amicable numbers is (220, 284). They are amicable because the proper divisors of 220 are 1, 2, 4, 5, 10, 11, 20, 22, 44, 55 and 110, of which the sum is 284; and the proper divisors of 284 are 1, 2, 4, 71 and 142, of which the sum is 220. **Note:** 1 is included as a divisor but the numbers are not included as their own divisors. Write a java program that tests whether a given pair of numbers is amicable numbers or not. **Sample run 1:** Enter first number: 220 Enter second number: 284 220 and 284 are amicable numbers. **Sample run 2:** Enter first number: 220 Enter second number: 230 220 and 230 are not amicable numbers.
Code.	

```java
package ASSIGNMENT_5;
import java.util.*;
public class p1 {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.print("Enter 1st Number : ");
        int n1 = sc.nextInt();
        System.out.print("Enter 2st Number : ");
        int n2 = sc.nextInt();
        int sum = 0;
        int sum1 = 0;
        for (int i=1 ; i<n1 ; i++) {
            if (n1 % i == 0) {
                sum = sum + i;
            }
        }
        for (int i=1 ; i<n2 ; i++) {
            if (n2 % i == 0) {
                sum1 = sum1 + i;
            }
        }
        if ((n1 == sum1) && (n2 == sum)) {
            System.out.println(n1 + " and " + n2 + " are Amicable
Number");
        } else {
            System.out.println(n1 + " and " + n2 + " are not Amicable
Number");
        }
    }
```

	} Output. Enter 1st Number : 220 Enter 2st Number : 284 220 and 284 are Amicable Number Enter 1st Number : 220 Enter 2st Number : 230 220 and 230 are not Amicable Number
2.	WAP to check whether a number is twisted prime or not. Twisted prime is a number if the number and its reverse both are prime then it is called twisted prime. **Sample run 1:** Enter a number: 97 97 is twisted prime. **Sample run 2: 43** 43 is not a twisted prime
Code.	

```java
package ASSIGNMENT_5;
import java.util.*;
public class p2 {
    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;
        int t = 0;
        int t1 = 0;

        int rev = 0;
        while (n > 0) {
            int r = n % 10;
            rev = rev * 10 + r;
            n = n / 10;
        }

        for (int i=2 ; i<n ; i++) {
            if (n % i == 0) {
                t++;
            }
        }
        for (int i=2 ; i<rev ; i++) {
            if (rev % i == 0) {
                t1++;
            }
        }

        if ((t > 0) || (t1 > 0)) {
            System.out.println(n1 + " is not Twisted prime");
```

```
        } else {
            System.out.println(n1 + " is Twisted prime");
        }
    }
}
```

Output.

Enter a Number : 97
97 is Twisted prime

Enter a Number : 43
43 is not Twisted prime

3. WAP to enter the first number and second number. Display the prime numbers between the first and second number.

Sample run:

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

Code.

```
package ASSIGNMENT_5;
import java.util.*;
public class p3 {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.print("Enter 1st Number : ");
        int n1 = sc.nextInt();
        System.out.print("Enter 2nd Number : ");
        int n2 = sc.nextInt();
        System.out.print("Prime numbers between " + n1 + " and " + n2 +
" are : ");
        int f = 0;
        for (int i=n1 ; i<=n2 ; i++) {
            for (int j=2 ; j<i ; j++) {
                if (i % j == 0) {
                    f = 0;
                    break;
                } else {
                    f = 1;
                }
            }
            if (f == 1) {
                System.out.print(i + " ");
            }
        }
    }
}
```

Output.

Enter 1st Number : 4
Enter 2nd Number : 15
Prime numbers between 4 and 15 are : 5 7 11 13

4.	WAP to calculate and display the factorial of all numbers between m and n (where m < n, m > 0, n > 0)
	Sample run:
	`Enter the value of m: 2`
	`Enter the value of n: 5`
	`Factorial of 2 is: 2`
	`Factorial of 3 is: 6`
	`Factorial of 4 is: 24`
	`Factorial of 5 is: 120`

Code.	`package ASSIGNMENT_5;`
	`import java.util.*;`
	`public class p4 {`
	`  public static void main(String[] args) {`
	`  Scanner sc = new Scanner(System.in);`
	`  System.out.print("Enter 1st Number : ");`
	`  int n1 = sc.nextInt();`
	`  System.out.print("Enter 2st Number : ");`
	`  int n2 = sc.nextInt();`
	
	`  for (int i=n1 ; i<=n2 ; i++) {`
	`  int f = 1;`
	`  for (int j=i ; j>=1 ; j--) {`
	`  f = f * j;`
	`  }`
	`  System.out.println("Fatorial of " + i + " is " + f);`
	`  }`
	`  }`
	`}`

Output.	Enter 1st Number : 2 Enter 2st Number : 5 Fatorial of 2 is 2 Fatorial of 3 is 6 Fatorial of 4 is 24 Fatorial of 5 is 120
5.	WAP to display the multiplication table from 2 to 15

Code.	`package ASSIGNMENT_5;`
	`import java.util.*;`
	`public class p5 {`
	`  public static void main(String[] args) {`
	`  Scanner sc = new Scanner(System.in);`
	`  System.out.print("Enter 1st Number : ");`
	`  int n1 = sc.nextInt();`
	`  System.out.print("Enter 2st Number : ");`
	`  int n2 = sc.nextInt();`
	
	`  for (int i=n1 ; i<=n2 ; i++) {`

```
            System.out.println("Multiplication of " + i);
            for (int j=1 ; j<=10 ; j++) {
                int m = i * j;
                System.out.println(i + " X " + j + " = " + m);
            }
        }
    }
}
```

Output.

```
Multiplication table of 2
2 × 1 = 2
2 × 2 = 4
:
:
2 × 10 = 20
Multiplication table of 3
3 × 1 = 3
3 × 2 = 6
:
:
3 × 10 = 30
:
:
:
Multiplication table of 15
15 × 1 = 15
15 × 2 = 30
:
:
15 × 10 = 150
```

6. Write a program to print the following outputs using **for** loops:

(a).

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

Code.

```
package ASSIGNMENT_5;
import java.util.*;
public class p6_a {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.print("Enter a Number : ");
        int n = sc.nextInt();

        for (int i=1 ; i<=n ; i++) {
            for (int j=1 ; j<=i ; j++) {
                System.out.print("* ");
            }
```

```
            System.out.println();
        }
    }
}
```

Output.

```
Enter a Number : 5
*
* *
* * *
* * * *
* * * * *
```

(b).

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

Code.

```
package ASSIGNMENT_5;
import java.util.*;
public class p6_b {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.print("Enter a Number : ");
        int n = sc.nextInt();

        for (int i=1 ; i<=n ; i++) {
            for (int j=1 ; j<=i ; j++) {
                System.out.print(i + " ");
            }
            System.out.println();
        }
    }
}
```

Output.

```
Enter a Number : 5
1
2 2
3 3 3
4 4 4 4
5 5 5 5 5
```

(c).

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

Code.

```
package ASSIGNMENT_5;
import java.util.*;
public class p6_c {
    public static void main(String[] args) {
```

```
        Scanner sc = new Scanner(System.in);
        System.out.print("Enter a Number : ");
        int n = sc.nextInt();

        int s = 1;
        for (int i=1 ; i<=n ; i++) {
            for (int j=1 ; j<=i ; j++) {
                System.out.print(s + " ");
                s++;
            }
            System.out.println();
        }
    }
}
```

Output.

```
Enter a Number : 5
1
2 3
4 5 6
7 8 9 10
11 12 13 14 15
```

(d).

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

Code.

```
package ASSIGNMENT_5;
import java.util.*;
public class p6_d {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.print("Enter a Number : ");
        int n = sc.nextInt();
        for (int i=1 ; i<=n ; i++) {
            for (int j=1 ; j<=i ; j++) {
                System.out.print(j + " ");
            }
            System.out.println();
        }
    }
}
```

Output.

```
Enter a Number : 5
1
1 2
1 2 3
1 2 3 4
1 2 3 4 5
```

7.	Write a program to print the following outputs using **for** loops:
(a).	A A B A B C A B C D A B C D E

Code.	`package ASSIGNMENT_5;`
	`import java.util.*;`
	`public class p7_a {`
	`  public static void main(String[] args) {`
	`  Scanner sc = new Scanner(System.in);`
	`  System.out.print("Enter a Number : ");`
	`  int n = sc.nextInt();`
	`  int a = 65;`
	`  for (int i=a ; i<a+n ; i++) {`
	`  for (int j=a ; j<=i ; j++) {`
	`  System.out.print((char)j + " ");`
	`  }`
	`  System.out.println();`
	`  }`
	`  sc.close();`
	`  }`
	`}`

Output.	Enter a Number : 5 A A B A B C A B C D A B C D E
(b).	$ $ $ $ $ $ $ $ $ $ $ $ $ $ $

Code.	`package ASSIGNMENT_5;`
	`import java.util.*;`
	`public class p7_b {`
	`  public static void main(String[] args) {`
	`  Scanner sc = new Scanner(System.in);`
	`  System.out.print("Enter a Number : ");`
	`  int n = sc.nextInt();`
	
	`  for (int i=(n-1) ; i>=0 ; i--) {`
	`  for (int j=0 ; j<=i ; j++) {`
	`  System.out.print("$ ");`

```
            }
            System.out.println();
        }
        sc.close();
    }
}
```

Output.

```
Enter a Number : 5
$ $ $ $ $
$ $ $ $
$ $ $
$ $
$
```

(c).

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

Code.

```
package ASSIGNMENT_5;
import java.util.*;
public class p7_c {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.print("Enter a Number : ");
        int n = sc.nextInt();

        for (int i=1 ; i<=n ; i++) {
            //space
            for (int j=1 ; j<=n-i ; j++) {
                System.out.print("  ");
            }
            //pattern
            for (int j=1 ; j<=i ; j++) {
                System.out.print(i + " ");
            }
            System.out.println();
        }
    }
}
```

Output.

```
Enter a Number : 5
      1
    2 2
  3 3 3
 4 4 4 4
5 5 5 5 5
```

8. WAP to enter the value of n and display find the following sum of the series:
1 + (1 + 2) + (1+ 2 +3) ..... + (1 + 2 + 3 + ... + n)

Code.

```java
package ASSIGNMENT_5;
import java.util.*;
public class p8 {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.print("Enter a Number : ");
        int n = sc.nextInt();
        int sum = 0;
        for (int i=1 ; i<=n ; i++) {
            for (int j=1 ; j<=i ; j++) {
                sum = sum + j;
            }
        }
        System.out.println("The sum is " + sum);
    }
}
```

Output.

```
Enter a Number : 5
The sum is 35
```

9. Write a program that will read the value of n from the user and calculate sum of the following series:

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

Output.

```java
package ASSIGNMENT_5;
import java.util.*;
public class p9 {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.print("Enter a Number : ");
        int n = sc.nextInt();
        double sum = 0;
        for (int i=1 ; i<=n ; i++) {
            double s = 1 / Math.pow(i , 2);
            sum = sum + s;
        }
        System.out.println("The sum is " + sum);
    }
}
```

Code.

```
Enter a Number : 5
The sum is 1.4636111111111112

Enter a Number : 10
The sum is 1.5497677311665408
```

10. Given a=0, b=1 and c=1 are the first three numbers 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 up to n terms where n > 3.

Code.

```java
package ASSIGNMENT_5;
```

```java
import java.util.*;
public class p10 {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.print("Enter a Number : ");
        int n = sc.nextInt();

        int a = 0 , b = 1 , c = 1;
        System.out.print(a + " " + b + " " + c + " ");

        for (int i=3 ; i<=n ; i++) {
            int sum = a + b + c;
            System.out.print(sum + " ");
            a = b;
            b = c;
            c = sum;
        }
    }
}
```

Output.

```
Enter a Number : 5
0 1 1 2 4 7

Enter a Number : 10
0 1 1 2 4 7 13 24 44 81 149
```

HW_1. Write a program to print the following patterns:

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

Code.

```java
package ASSIGNMENT_5;
import java.util.*;
public class HW_1 {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.print("Enter a Number : ");
        int n = sc.nextInt();

        for (int i=1 ; i<=n ; i++) {
            for (int j=n ; j>=1 ; j--) {
                if (i != j) {
                    System.out.print(j + " ");
                }else {
                    System.out.print("* ");
                }
            }
```

```
            System.out.println();
        }
    }
}
```

Output.

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

HW_2. Write a program to print the following patterns using loops:

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

Code.

```
package ASSIGNMENT_5;
import java.util.*;
public class HW_2 {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.print("Enter a number : ");
        int n = sc.nextInt();

        for (int i=1 ; i<=n ; i++) {
            //space
            for (int j=1 ; j<=n-i ; j++) {
                System.out.print("  ");
            }
            for (int j=1 ; j<(i*2) ; j++) {
                System.out.print("* ");
            }
            System.out.println();
        }
    }
}
```

Output.

```
Enter a number : 4
      *
    * * *
  * * * * *
* * * * * * *
```

HW_3. Write a java program to evaluate the function sin(x) as defined by the infinite series expansion

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

Code.

```
package ASSIGNMENT_5;
import java.util.*;
```

```java
public class HW_3 {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);

        System.out.print("Enter the Number of Term : ");
        int n = sc.nextInt();

        System.out.print("Enter the value of theta : ");
        int theta = sc.nextInt();

        double radian = theta*Math.PI / 180;
        int p = 1;
        double sinx = 0;

        for (int i=1 ; i<=n ; i++) {
            int f = 1;
            for (int j=1 ; j<=p ; j++) {
                f = f * j;
            }
            double ct = 0;
            if (i % 2 == 0) {
                ct = -Math.pow(radian, p) / f;
            } else {
                ct = Math.pow(radian, p) / f;
            }
            sinx = sinx + ct;
            p = p + 2;
        }
        System.out.println("The sin x value is " + sinx);

    }
}
```

Output.

```
Enter the Number of Term : 4
Enter the value of theta : 45
The sin x value is 0.7071064695751781
```

HW_4.

Write a java program to evaluate the function sin(x) as defined by the infinite series expansion.

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

Code.

```java
package ASSIGNMENT_5;
import java.util.*;
public class HW_4 {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);

        System.out.print("Enter the number of terms : ");
```

```
        int n = sc.nextInt();

        System.out.print("Enter the value of theta : ");
        int theta = sc.nextInt();

        double radian = theta*Math.PI / 180;
        int p = 0;
        double cosx = 0;

        for (int i=1 ; i<=n ; i++) {
            // factorial
            int f = 1;
            for (int j=1 ; j<=p ; j++) {
                f = f * j;
            }

            double ct = 0;
            if (i % 2 != 0) {
                ct = Math.pow(radian, p) / f;
            } else {
                ct = -Math.pow(radian, p) / f;
            }
            cosx = cosx + ct;
            p = p + 2;
        }
        System.out.println("The cos x value is " + cosx);

    }
}
```

Output.

```
Enter the number of terms : 4
Enter the value of theta : 90
The cos x value is -8.945229984747317E-4
```

HW_5.

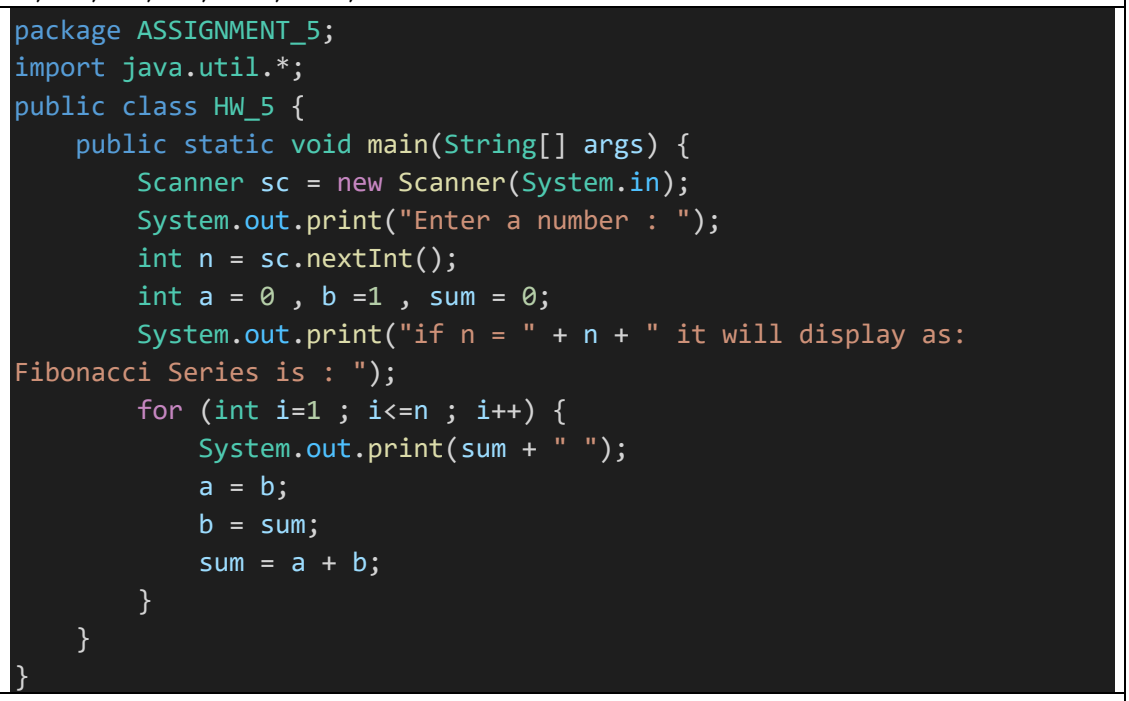
Write a java program to generate and print the first n terms of the Fibonacci sequence where n>=1.
The first few terms are: `0, 1, 1, 2, 3, 5, 8, 13, ......`
Each term beyond the first two is derived from the sum of its two nearest predecessors i.e. a new term in the series (Except the first two) is found by the following formula.

`new term=preceding term + term before the preceding term`

Let us define: c as new term b as the preceding term a as the term before the preceding term `So, c= b + a` Your program should handle for all positive values of n.

Example:

```
If n=1, it will display as: Fibonacci Series is: 0
If n=2, it will display as: Fibonacci Series is: 0, 1
```

	If n=3, it will display as: Fibonacci Series is: 0, 1, 1 …. If n=10, it will display as: Fibonacci Series is: 0, 1, 1, 2, 3, 5, 8, 13, 21, 34
Code.	
Output.	Enter a number : 1 if n = 1 it will display as: Fibonacci Series is : 0 Enter a number : 2 if n = 2 it will display as: Fibonacci Series is : 0 1 Enter a number : 3 if n = 3 it will display as: Fibonacci Series is : 0 1 1 Enter a number : 10 if n = 10 it will display as: Fibonacci Series is : 0 1 1 2 3 5 8 13 21 34

```java
package ASSIGNMENT_5;
import java.util.*;
public class HW_5 {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.print("Enter a number : ");
        int n = sc.nextInt();
        int a = 0 , b =1 , sum = 0;
        System.out.print("if n = " + n + " it will display as:
Fibonacci Series is : ");
        for (int i=1 ; i<=n ; i++) {
            System.out.print(sum + " ");
            a = b;
            b = sum;
            sum = a + b;
        }
    }
}
```