Assignment-I

1. **Write a java program to display following messages.**

Hello World!
Hello Again
I like typing this.
This is fun.
Yay! Printing.
I'd much rather you 'not'.
I "said" do not touch this.

```
public class A1Q1 {
public static void main(String[] args) {
    System.out.println("Hello World!");
    System.out.println("Hello Again");
    System.out.println("I like typing this.");
    System.out.println("This is fun.");
    System.out.println("Yay! Printing.");
    System.out.println("I'd much rather you 'not'.");
    System.out.println("I \"said\" do not touch this.");
    }
}
```

5. Write a java program that stores your Regd. No and year of admission into two variables, and displays their values on the screen.

My Regd. No is 191123142 and I have taken admission in B. Tech. In 2019.

```
public class A1Q5 {
    public static void main(String[] args) {
        int regd=191123142;
        int year=2019;
        System.out.println("My Regd. No is "+regd+ "and I have taken admission in B. Tech.
In"+year+".");
        }
    }
```

6. Let we have two values 113, 2.71828. Then, declare two different variables to hold the given values. Write the java program to display the values of these two variables on the screen, one per line.

This is room # 113
e is close to 2.71828

```
public class A1Q6 {
    public static void main(String[] args) {
        double e=2.71828;
        int a=113;
        System.out.println("This is room # "+a);
        System.out.println("e is close to "+e);
        }
    }
```

7. Write a java program to exchange the values of two variables of integer type A and B using third temporary variable C.

```
public class A1Q7 {
```

```
    public static void main(String[] args) {
        int a,b,c;
        a=12;
        b=15;
        System.out.println("Before swapping a="+a+"b="+b);
        c=a;
        a=b;
        b=c;
        System.out.println("After swapping a="+a+"b="+b);
    }
}
```

8. Write a java program to exchange the values of two variables of integer type A and B without using third temporary variable.

```
public class A1q8 {
    public static void main(String[] args) {
        int a=14;
        int b=17;
        System.out.println("Before swapping a="+a+"b="+b);
        a=a+b;
        b=a-b;
        a=a-b;
        System.out.println("After swapping a="+a+"b="+b);
    }
}
```

9. What do each of the following print?
a.System.out.println(2 + "bc");
b.System.out.println(2 + 3 + "bc");
c.System.out.println((2+3) + "bc");
d.System.out.println("bc" + (2+3));
e.System.out.println("bc" + 2 + 3);

2bc
5bc
5bc
bc5
bc23

10. What do each of the following print?
a. System.out.println('b');
b. System.out.println('b' + 'c');
c. System.out.println((char) ('a' + 4));

b
197
e

11. Suppose that a variable a is declared as int a = 2147483647 (or equivalently, Integer.MAX_VALUE). What do each of the following print?
a. System.out.println(a);
b. System.out.println(a+1);
c. System.out.println(2-a);
d. System.out.println(-2-a);

e. System.out.println(2*a);
f. System.out.println(4*a);

2147483647
-2147483648
-2147483645
2147483647
-2
-4

12. Suppose that a variable a is declared as double a = 3.14159. What do each of the following print?
a. System.out.println(a);
b. System.out.println(a+1);
c. System.out.println(8/(int) a);
d. System.out.println(8/a);
e. System.out.println((int) (8/a));

3.14159
4.14159
2
2.5464812403910124
2

13. Assume a string variable *ruler1* contains "1" initially i.e. *String ruler1="1"* . Write a java program to print the following output.
1
1 2 1
1 2 1 3 1 2 1
1 2 1 3 1 2 1 4 1 2 1 3 1 2 1

```
public class A1q13 {
	public static void main(String[] args) {
		String ruler1="1";
		System.out.println(ruler1);
		ruler1=ruler1+ 2 + ruler1;
		System.out.println(ruler1);
		ruler1=ruler1+ 3 + ruler1;
		System.out.println(ruler1);
		ruler1=ruler1+ 4 + ruler1;
		System.out.println(ruler1);
		}
}
```

Assignment-II

Using Keyboard Input

1. Write a program that reads a Celsius degree in a double value from the console, then converts it to Fahrenheit and displays the result. The formula for the conversion is as follows:

fahrenheit = (9 / 5) * celsius + 32

```
import java.util.Scanner;
public class A2Q1 {
	public static void main(String[] args) {
		Scanner input = new Scanner(System.in);
		System.out.print("Enter a degree in Celsius: ");
		double celsius = input.nextDouble();
		double fahrenheit = (9.0 / 5) * celsius + 32;
		System.out.println(celsius + " Celsius is " + fahrenheit + " Fahrenheit");
	}
}
```

2. Write a program that reads in the radius and length of a cylinder and computes the area and volume using the following formulas:

area = radius * radius * pi
volume = area * length

```
import java.util.Scanner;
public class A2Q2 {
	public static void main(String[] args) {
		Scanner input = new Scanner(System.in);
		final double PI = 3.14159265359;
		System.out.print("Enter the radius and length of a cylinder: ");
		double radius = input.nextDouble();
		double length = input.nextDouble();
		double area = radius * radius * PI;
		double volume = area * length;
		System.out.println("The area is " + area);
		System.out.println("The volume is " + volume);
	}
}
```

3. Write a program that reads a number in feet, converts it to meters, and displays the result. One foot is 0.305 meter.

```
import java.util.Scanner;
public class A2Q3 {
	public static void main(String[] args) {
		Scanner input = new Scanner(System.in);
		System.out.print("Enter a value for feet: ");
		double feet = input.nextDouble();
		double meters = feet * 0.305;
		System.out.println(feet + " feet is " + meters + " meters");
	}
}
```

4. Write a program that reads an integer between 0 and 1000 and adds all the digits in the integer. For example, if an integer is 932, the sum of all its digits is 14. Hint: Use the % operator

to extract digits, and use the / operator to remove the extracted digit. For instance, 932 % 10 = 2 and 932 / 10 = 93.

```
import java.util.Scanner;
public class A2Q4 {
	public static void main(String[] args) {
	Scanner sc=new Scanner(System.in);
	int n, x, sum=0;
	System.out.println("Enter number between 0 and 1000");
	n=sc.nextInt();

	x=n % 10;
	sum=sum + x;
	n=n / 10;

	x=n % 10;
	sum=sum + x;
	n=n / 10;

	x=n % 10;
	sum=sum + x;
	n=n / 10;
	System.out.println(“The sum of the digits is” + sum);
	}
}
```

5. Average acceleration is defined as the change of velocity divided by the time taken to make the change, as shown in the following formula:

$$a = \frac{v1 - v0}{t}$$

Write a program that prompts the user to enter the starting velocity v0 in meters/second, the ending velocity v1 in meters/second, and the time span t in seconds,and displays the average acceleration.

```
import java.util.Scanner;
public class A2Q5 {
	public static void main(String[] args) {
		Scanner input = new Scanner(System.in);
		System.out.print("Enter v0, v1 and t: ");
		double v0 = input.nextDouble();
		double v1 = input.nextDouble();
		double t = input.nextDouble();
		double a = (v1 - v0) / t;
		System.out.println("The average acceleration is " + a);
	}
}
```

6. Body Mass Index (BMI) is a measure of health on weight. It can be calculated by taking your weight in kilograms and dividing by the square of your height in meters. Write a program that prompts the user to enter a weight in pounds and height in inches and displays the BMI. Note that one pound is 0.45359237 kilograms and one inch is 0.0254 meters.

```
import java.util.Scanner;
```

```
public class A2Q6{
	public static void main(String[] args) {
		Scanner input = new Scanner(System.in);
		System.out.print("Enter weight in pounds: ");
		double weight = input.nextDouble();
		System.out.print("Enter height in inches: ");
		double height = input.nextDouble();
		weight = weight * 0.45359237;
		height = height * 0.0254;
		double bmi = weight / Math.pow(height, 2);
		System.out.println("BMI is " + bmi);
	}
}
```

7. Write a program that prompts the user to enter the side of a hexagon and displays its area.

```
import java.util.Scanner;
public class A2Q7{
	public static void main(String[] args) {
		Scanner input = new Scanner(System.in);
		System.out.print("Enter the side: ");
		double side = input.nextDouble();
		double area = ((3 * Math.pow(3, 0.5)) / 2) * Math.pow(side, 2);
		System.out.println("The area of the hexagon is " + area);
	}
}
```

8. Write a program that displays the following table. Cast floating point numbers into integers.

a	**b**	**pow(a, b)**
1	**2**	**1**
2	**3**	**8**
3	**4**	**81**
4	**5**	**1024**
5	**6**	**15625**

```
public class A2Q8 {
	public static void main(String[] args) {
		float a, b;
		System.out.println("a	b	pow(a, b)");
		a = 1;
		b = 2;
		System.out.println((int)a + "	" + (int)b + "	" + (int)Math.pow(a, b));
		a++;
		b++;
		System.out.println((int)a + "	" + (int)b + "	" + (int)Math.pow(a, b));
		a++;
		b++;
		System.out.println((int)a + "	" + (int)b + "	" + (int)Math.pow(a, b));
		a++;
		b++;
		System.out.println((int)a + "	" + (int)b + "	" + (int)Math.pow(a, b));
		a++;
		b++;
```

```
            System.out.println((int)a + "        " + (int)b + "        " + (int)Math.pow(a, b));
        }
}
```

9. Write a program that prompts the user to enter two points (x1, y1) and (x2, y2) and displays their distance between them.

```
import java.util.Scanner;
public class A2Q9 {
    public static void main(String[] args) {
        Scanner input = new Scanner(System.in);
        System.out.print("Enter x1 and y1: ");
        double x1 = input.nextDouble();
        double y1 = input.nextDouble();
        System.out.print("Enter x2 and y2: ");
        double x2 = input.nextDouble();
        double y2 = input.nextDouble();
        double distance = Math.pow(Math.pow(x2 - x1, 2) +Math.pow(y2 - y1, 2), 0.5);
        System.out.println("The distance between the two points is " + distance);
    }
}
```

10. Write a program that prompts the user to enter three points (x1, y1), (x2, y2), (x3, y3) of a triangle and displays its area.

```
import java.util.Scanner;
public class A2Q10 {
    public static void main(String[] args) {
        Scanner input = new Scanner(System.in);
        System.out.print("Enter three points for a triangle: ");
        double x1 = input.nextDouble();
        double y1 = input.nextDouble();
        double x2 = input.nextDouble();
        double y2 = input.nextDouble();
        double x3 = input.nextDouble();
        double y3 = input.nextDouble();
        double side1 = Math.pow(Math.pow(x2 - x1, 2) + Math.pow(y2 - y1, 2), 0.5);
        double side2 = Math.pow(Math.pow(x3 - x2, 2) + Math.pow(y3 - y2, 2), 0.5);
        double side3 = Math.pow(Math.pow(x1 - x3, 2) + Math.pow(y1 - y3, 2), 0.5);
        double s = (side1 + side2 + side3) / 2;
        double area = Math.pow(s * (s - side1) * (s - side2) * (s - side3), 0.5);
        System.out.println("The area of the triangle is " + area);
    }
}
```

11. Write a program that reads in investment amount, annual interest rate, and number of years, and displays the future investment value using the following formula: futureInvestmentValue =investmentAmount * (1 + monthlyInterestRate)^numberOfYears*12 For example, if you enter amount 1000, annual interest rate 3.25%, and number of years 1, the future investment value is 1032.98.

```
import java.util.Scanner;
public class A2Q11 {
    public static void main(String[] args) {
        Scanner input = new Scanner(System.in);
```

```
        System.out.print("Enter investment amount: ");
        double amount = input.nextDouble();
        System.out.print("Enter annual interest rate in percentage: ");
        double monthlyInterestRate = input.nextDouble();
        monthlyInterestRate /= 1200;
        System.out.print("Enter number of years: ");
        int years = input.nextInt();
    double futureInvestmentValue =  amount * Math.pow(1 + monthlyInterestRate, years * 12);
        System.out.println("Accumulated value is $" + futureInvestmentValue);
    }
}
```

12. If you have N eggs, then you have N/12 dozen eggs, with N%12 eggs left over. (This is essentially the definition of the / and % operators for integers.) Write a java program that asks the user how many eggs she has and then tells the user how many dozen eggs she has and how many extra eggs are left over. A gross of eggs is equal to 144 eggs. Extend your program so that it will tell the user how many gross, how many dozen, and how many left over eggs she has. For example, if the user says that she has 1342 eggs, and then your program would respond with "Your number of eggs is 9 gross, 3 dozen, and 10."

```
import java.util.Scanner;
public class A2Q12 {
    public static void main(String[] args) {
        int num,dozen,gross;
        Scanner sc=new Scanner(System.in);
        System.out.println("How many eggs do you have?");
        num=sc.nextInt();
        gross=num/144;
        num=num%144;
        dozen=num/12;
        num=num%12;
       System.out.println("Your number of eggs "+gross+"gross,"+dozen+"dozens,"+"and"+num);
    }
}
```

13. Write a program that prompts the user to enter the minutes (e.g., 1 billion), and displays the number of years and days for the minutes. For simplicity, assume a year has 365 days.

```
import java.util.Scanner;
public class A2Q13 {
    public static void main(String[] args) {
        Scanner input = new Scanner(System.in);
        System.out.print("Enter the number of minutes: ");
        int minutes = input.nextInt();
        int years = minutes / 525600;
        int days = (minutes % 525600) / 1440;
System.out.println(minutes + "minutes is approximately " + years + " years and " + days + " days");
    }
}
```

Using Command Line Argument

14. Write a java program that takes two positive integers as command-line arguments and prints true if either evenly divides the other.

```
public class A2Q14 {
    public static void main(String[] args) {
        int a,b;
        a=Integer.parseInt(args[0]);
        b=Integer.parseInt(args[1]);
        boolean ans=((a%b==0)||(b%a==0));
        System.out.println(ans);
    }
}
```

15. Write a java program that takes two int values a and b from the command line and prints a random integer between a and b.

```
public class A2Q15 {
    public static void main(String[] args) {
        int min;
        int max;
        min=Integer.parseInt(args[0]);
        max=Integer.parseInt(args[1]);
        int c=min+(int)(Math.random()*(max-min+1));
        System.out.println("c="+c);
    }
}
```

16. Write a java program that prints the sum of two random integers between 1 and 6 (such as you might get when rolling dice).

```
public class A2Q16 {
    public static void main(String[] args) {
        int a,b,res1,res2;
        a=Integer.parseInt(args[0]);
        b=Integer.parseInt(args[1]);
        res1=a+(int)(Math.random()*(a-b+1));
        res2=a+(int)(Math.random()*(a-b+1));
        int sum=res1+res2;
        System.out.println(sum);
    }}
```

17. Write a java program that takes three positive integers as command-line arguments and prints true if any one of them is greater than or equal to the sum of the other two and false otherwise. (Note: This computation tests whether the three numbers could be the lengths of the sides of some triangle.)

```
public class A2Q17 {
    public static void main(String[] args) {
        int a,b,c;
        a=Integer.parseInt(args[0]);
        b=Integer.parseInt(args[1]);
```

```
        c=Integer.parseInt(args[2]);
        boolean res=((a+b)>=c)||((b+c)>=a)||((a+c)>=b);
        System.out.println(res);
    }
}
```

18. Write a java program that takes three double values x, y, and z as command-line arguments and prints true if the values are strictly ascending or descending (x < y < z or x > y > z), and false otherwise.

```
public class A2Q18 {
    public static void main(String[] args) {
        int x,y,z;
        x=Integer.parseInt(args[0]);
        y=Integer.parseInt(args[1]);
        z=Integer.parseInt(args[2]);
        boolean res=((x<y&&y<z)||(x>y&&y>z));
        System.out.println(res);
    }
}
```

19. Input the basic salary of an employee of an organization through the keyboard. His dearness allowance (DA) is 40% of basic salary, and house rent allowance (HRA) is 20% of basic salary. Write a java program to calculate his gross salary.

```
public class A2Q19 {
    public static void main(String[] args) {
        double basic,HRA,DA,gross;
        System.out.println("Enter the basic salary of the person");
        basic=Double.parseDouble(args[0]);
        DA=0.40*basic;
        HRA=0.20*basic;
        gross=basic+DA+HRA;
        System.out.println("The gross salary is: "+gross);
    }
}
```

20. Write a program that takes two int values m and d from the command line and prints true if day d of month m is between 3/20 and 6/20, false otherwise.

```
public class A2Q20 {
    public static void main(String[] args) {
        int m,d;
        m=Integer.parseInt(args[0]);
        d=Integer.parseInt(args[1]);
        boolean res=(m==3&&d>=20)||(m==4&&d<=30)||(m==5&&d<=31)||(m==6&&d<=20);
        System.out.println(res);
    }
}
```

21.Write a java program that takes a double value t from the command line and prints the value of sin (2t) + sin (3t).

```
public class A2Q21 {
	public static void main(String[] args) {
		double t,sum;
		t=Double.parseDouble(args[0]);
		t=Math.toRadians(t);			// convert degree to radian
		sum=Math.sin(2*t)+Math.sin(3*t);
		System.out.println(sum);
}
}
```

22. Write a java program that calculates the monthly payments you would have to make over a given number of years to pay off a loan at a given interest rate compounded continuously, taking the number of years t, the principal P, and the annual interest rate r as command-line arguments. The desired value is given by the formula Pert. Use Math.exp ().

```
public class A2Q22 {
	public static void main(String[] args) {
		double p,r,t;
		p=Double.parseDouble(args[0]);
		r=Double.parseDouble(args[1]);
		t=Double.parseDouble(args[2]);
		double monthly_payment=p*Math.exp(r*t);
		System.out.println(monthly_payment);
	}
}
```

23. Write a program that takes three int values from the command line and prints them in ascending order. Use Math.min() and Math.max().

```
public class A2Q23 {
	public static void main(String[] args) {
		int a,b,c;
		a=Integer.parseInt(args[0]);
		b=Integer.parseInt(args[1]);
		c=Integer.parseInt(args[2]);
		int max=Math.max(a,Math.max(b,c));
		int min=Math.min(a,Math.min(b,c));
		int median=(a+b+c)-max-min;
		System.out.println(min+" "+median+" "+max);
	}
}
```

24. Write a java program that prints five uniform random values between 0 and 1, their average value, and their minimum and maximum value. Use Math.random(), Math.min(), and Math.max().

```
public class A2Q24 {
	public static void main(String[] args) {
		double r1,r2,r3,r4,r5;
		r1=Math.random();
		r2=Math.random();
		r3=Math.random();
		r4=Math.random();
		r5=Math.random();
```

```
        System.out.println(r1+" "+r2+" "+r3+" "+r4+" "+r5);
        double sum=r1+r2+r3+r4+r5;
        double avg=sum/5;
        System.out.println("Average ="+avg);
        double max=Math.max(r1,Math.max(r2,Math.max(r3,Math.max(r4, r5))));
        double min=Math.min(r1,Math.min(r2,Math.min(r3,Math.min(r4, r5))));
        System.out.println("Max="+max);
        System.out.println("Min="+min);
    }
}
```

ASSIGNMENT-3

1. Write a java program to input the height of the person and check if the height of the person is greater than or equal to 6 feet then print the message "The person is tall".

```
import java.util.Scanner;
public class A3Q1 {
    public static void main(String[] args) {
        Scanner sc=new Scanner(System.in);
        int h;
        System.out.println("Enter the height of the person");
        h=sc.nextInt();
        if(h>6)
            System.out.println("The person is tall");
    }
}
```

2. Write a java program to input the mark of a student and check if the student mark is greater than or equal to 40, then it generates the following message.
"Congratulation! You have passed the exam."
Otherwise the output message is
"Sorry! You have failed the exam."

```
import java.util.Scanner;
public class A3Q2 {

    public static void main(String[] args) {
        Scanner sc=new Scanner(System.in);
        int mark;
        System.out.println("Enter the mark of the student");
        mark=sc.nextInt();
        if(mark>=40)
         System.out.println("Congratulations! You have passed the exam");
        else
         System.out.println("sorry! you have failed the exam");
    }
}
```

3. Input an integer through the keyboard. Write a java program to find out whether it is an odd number or even number.

```
import java.util.Scanner;
public class A3Q3 {
	public static void main(String[] args) {
	   Scanner sc=new Scanner(System.in);
	   int n;
	   System.out.println("Enter a number");
	   n=sc.nextInt();
	   if(n%2==0)
	     System.out.println("Even number");
	     else
	          System.out.println("Odd number");
	     }
}
```

4. Any character is entered through the keyboard, write a java program to determine whether the character entered is a capital letter, a small case letter, a digit or a special symbol. The following table shows the range of ASCII values for various characters.

Characters	ASCII Values
A – Z	65 – 90
a – z	97 – 122
0 – 9	48 – 57
special symbols	0 - 47, 58 - 64, 91 - 96, 123 – 127

```
import java.util.Scanner;
public class A3Q4 {
	public static void main(String[] args) {
	     char c;
	     Scanner sc=new Scanner(System.in);
	     System.out.println("Enter a character");
	     c=sc.next().charAt(0);
	     if(c>=65 && c<=90)
	          System.out.println("The entered character is an uppercase");
	     else if(c>=97 && c<=122)
	          System.out.println("The entered character is a lower case");
	     else if(c>=48 && c<=57)
	          System.out.println("It is a digit");
	     else if((c>=0 && c<=47) || (c>=58 && c<=64) || (c>=91 && c<=96) || (c>=123 &&
c<=127))
	          System.out.println("It is a special Character");
	}
}
```

5. The two roots of a quadratic equation ax^2 + bx + c = 0 can be obtained using the following formula: b^2 - 4ac is called the discriminant of the quadratic equation. If it is positive, the equation has two real roots. If it is zero, the equation has one root. If it is negative, the equation has no real roots.

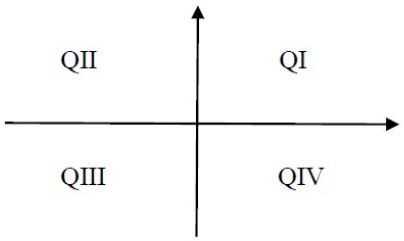
Write a program that prompts the user to enter values for a, b, and c and displays the result based on the discriminant. If the discriminant is positive, display two roots. If the discriminant is 0, display one root. Otherwise, display "The equation has no real roots". Note that you can use Math.pow(x, 0.5) to compute 2x.

```
import java.util.Scanner;
public class A3Q5 {
	public static void main(String[] args) {
		Scanner input = new Scanner(System.in);
		System.out.print("Enter a, b, c: ");
		double a = input.nextDouble();
		double b = input.nextDouble();
		double c = input.nextDouble();
		double discriminant = Math.pow(b, 2) - 4 * a * c;
		System.out.print("The equation has ");
		if (discriminant > 0)
		{
			double root1 = (-b + Math.pow(discriminant, 0.5)) / (2 * a);
			double root2 = (-b - Math.pow(discriminant, 0.5)) / (2 * a);
			System.out.println("two roots " + root1 + " and " + root2);
		}
		else if (discriminant == 0)
		{
			double root1 = (-b + Math.pow(discriminant, 0.5)) / (2 * a);
			System.out.println("one root " + root1);
		}
		else
			System.out.println("no real roots");
	}
}
```

6. A linear equation can be solved using Cramer's rule. Write a program that prompts the user to enter a, b, c, d, e, and f and displays the result. If ad - bc is 0, report that "The equation has no solution."

```
import java.util.Scanner;
public class A3Q6{
	public static void main(String[] args) {
		Scanner input = new Scanner(System.in);
		System.out.print("Enter a, b, c, d, e, f: ");
		double a = input.nextDouble();
		double b = input.nextDouble();
		double c = input.nextDouble();
		double d = input.nextDouble();
		double e = input.nextDouble();
		double f = input.nextDouble();
		if (a * d - b * c == 0)
			System.out.println("The equation has no solution.");
		else
		{
			double x = (e * d - b * f) / (a * d - b * c);
			double y = (a * f - e * c) / (a * d - b * c);
			System.out.println("x is " + x + " and y is " + y);
		}
	}
}
```

7. Write a java program that takes the x – y coordinates of a point in the Cartesian plane and prints a message telling either an axis on which the point lies or the quadrant in which it is found.




```
import java.util.Scanner;
public class A3Q7 {
	public static void main(String[] args) {
		Scanner sc=new Scanner(System.in);
		double x,y;
		System.out.println("Enter the x and y coordinate respectively");
		x=sc.nextDouble();
		y=sc.nextDouble();
		if(x==0)
			System.out.println("("+x+","+y+")is on the y-axis");
		else if(y==0)
			System.out.println("("+x+","+y+") is on the x-axis");
		else if(x>0 && y>0)
			System.out.println("("+x+","+y+") is on the first quadrant");
		else if(x<0 && y>0)
			System.out.println("("+x+","+y+") is on the second quadrant");
		else if(x<0 && y<0)
			System.out.println("("+x+","+y+" is on the third quadrant");
		else if(x<0 && y>0)
			System.out.println("("+x+","+y+") is on the fourth quadrant");
		else
			System.out.println("("+x+","+y+") is at center");
	}
}
```

8. If the ages of Rahul, Ayush and Ajay are input through the keyboard, write a java program to determine the youngest of the three.

```
import java.util.Scanner;
public class A3Q8 {
	public static void main(String[] args) {
		Scanner sc=new Scanner(System.in);
		int rahul, ayush, ajay;
		System.out.println("Enter the ages of Rahul, Ayush, Ajay respectively");
		rahul=sc.nextInt();
		ayush=sc.nextInt();
		ajay=sc.nextInt();
		if(rahul<ayush && rahul<ajay)
			System.out.println("Youngest is Rahul");
		else if(ayush<rahul && ayush<ajay)
			System.out.println("The youngest is Ayush");
		else
```

```
                System.out.println("The youngest is Ajay");
    }
}
```

9. Write a program that randomly generates an integer between 1 and 12 and displays the English month name January, February, …, December for the number 1, 2, …, 12, accordingly.

```
public class A3Q9 {
    public static void main(String[] args) {
        int month = (int)((Math.random() * 12) + 1);
        switch (month)
        {
            case 1: System.out.println("January"); break;
            case 2: System.out.println("February"); break;
            case 3: System.out.println("March"); break;
            case 4: System.out.println("April"); break;
            case 5: System.out.println("May"); break;
            case 6: System.out.println("June"); break;
            case 7: System.out.println("July"); break;
            case 8: System.out.println("August"); break;
            case 9: System.out.println("September"); break;
            case 10: System.out.println("October"); break;
            case 11: System.out.println("November"); break;
            case 12: System.out.println("December");
        }
    }
}
```

10. Write a program that prompts the user to enter an integer for today's day of the week (Sunday is 0, Monday is 1, …, and Saturday is 6). Also prompt the user to enter the number of days after today for a future day and display the future day of the week.

```
import java.util.Scanner;
public class A3Q10 {
    public static void main(String[] args) {
        Scanner input = new Scanner(System.in);
        System.out.print("Enter today's day: ");
        int day = input.nextInt();
        System.out.print("Enter the number of days elapsed since today: ");
        int daysElapsed = input.nextInt();
        int futureDay = (day + daysElapsed) % 7;
        System.out.print("Today is ");
        switch (day)
        {
            case 0: System.out.print("Sunday"); break;
            case 1: System.out.print("Monday"); break;
            case 2: System.out.print("Tuesday"); break;
            case 3: System.out.print("Wednesday"); break;
            case 4: System.out.print("Thursday"); break;
            case 5: System.out.print("Friday"); break;
            case 6: System.out.print("Saturday");
```

```
        }
        System.out.print(" and the future day is ");
        switch (futureDay)
        {
            case 0: System.out.println("Sunday"); break;
            case 1: System.out.println("Monday"); break;
            case 2: System.out.println("Tuesday"); break;
            case 3: System.out.println("Wednesday"); break;
            case 4: System.out.println("Thursday"); break;
            case 5: System.out.println("Friday"); break;
            case 6: System.out.println("Saturday");
        }
    }
}
```

11. The body mass index (BMI) is commonly used by health and nutrition professionals to estimate human body fat in populations. It is computed by taking the individual's weight (mass) in kilograms and dividing it by the square of their height in meters. i.e. BMI=weight(kg) / (*h*eight (m))^2 . Then use some if statements to show the category for a given

BMI. BMI	category
less than 18.5	underweight
18.5 to 24.9	normal weight
25.0 to 29.9	overweight
30.0 or more	obese

```
import java.util.Scanner;
public class A3Q11 {

    public static void main(String[] args) {
        Scanner sc=new Scanner(System.in);
        System.out.println("Enter the weight of a person in kg and height in meter");
        double wt=sc.nextDouble();
        double ht=sc.nextDouble();
        double BMI=wt/(ht*ht);
        System.out.println("BMI= "+BMI);
        if(BMI<18.5)
            System.out.println("Under weight");
        else if(BMI>=18.5 && BMI<25)
            System.out.println("Normal weight");
        else if(BMI>=25 && BMI<30)
            System.out.println("Over weight");
        else
            System.out.println("Abese");
        }

    }
```

12. Write a program that prompts the user to enter three integers and display the integers in non-decreasing order.

```
import java.util.Scanner;
```

```
public class A3Q12 {
	public static void main(String[] args) {
		Scanner input = new Scanner(System.in);
		System.out.print("Enter three integers: ");
		int a = input.nextInt();
		int b = input.nextInt();
		int c = input.nextInt();
		int max=Math.max(a,Math.max(b,c));
		int min=Math.min(a,Math.min(b,c));
		int median=(a+b+c)-max-min;
		System.out.println(min + " " + median + " " + max);
	}
}
```

13. Write a program that prompts the user to enter the month and year and displays the number of days in the month. For example, if the user entered month 2 and year 2012, the program should display that February 2012 had 29 days. If the user entered month 3 and year 2015, the program should display that March 2015 had 31 days.

```
import java.util.Scanner;
public class A3Q13 {
	public static void main(String[] args) {
		Scanner input = new Scanner(System.in);
		System.out.print("Enter the month as integer: ");
		int month = input.nextInt();
		System.out.print("Enter the year as integer: ");
		int year = input.nextInt();
		boolean leapYear = (year % 4 == 0 && year % 100 != 0) || (year % 400 == 0);
		switch (month)
		{
			case 1: System.out.println(
					"January " + year + " had 31 days"); break;
			case 2: System.out.println("February " + year + " had" +
												((leapYear) ? " 29 days" : " 28 days")); break;
			case 3: System.out.println(
					"March " + year + " had 31 days"); break;
			case 4: System.out.println(
					"April " + year + " had 30 days"); break;
			case 5: System.out.println(
					"May " + year + " had 31 days"); break;
			case 6: System.out.println(
					"June " + year + " had 30 days"); break;
			case 7: System.out.println(
					"July " + year + " had 31 days"); break;
			case 8: System.out.println(
					"August " + year + " had 31 days"); break;
			case 9: System.out.println(
					"September " + year + " had 30 days"); break;
			case 10: System.out.println(
					"October " + year + " had 31 days"); break;
			case 11: System.out.println(
					"November " + year + " had 30 days"); break;
```

```
                case 12: System.out.println(
                                "December " + year + " had 31 days");
            }
        }
}
```

14. Write a program that plays the popular scissor-rock-paper game. (A scissor can cut a paper, a rock can knock a scissor, and a paper can wrap a rock.) The program randomly generates a number 0, 1, or 2 representing scissor, rock, and paper. The program prompts the user to enter a number 0, 1, or 2 and displays a message indicating whether the user or the computer wins, loses, or draws.

```
import java.util.Scanner;
public class A3Q14 {
    public static void main(String[] args) {
        Scanner input = new Scanner(System.in);
        int computer = (int)(Math.random() * 3);
        System.out.print("scissor (0), rock (1), paper (2): ");
        int user = input.nextInt();
        System.out.print("The computer is ");
        switch (computer)
        {
            case 0: System.out.print("scissor."); break;
            case 1: System.out.print("rock."); break;
            case 2: System.out.print("paper.");
        }
        System.out.print(" You are ");
        switch (user)
        {
            case 0: System.out.print("scissor"); break;
            case 1: System.out.print("rock"); break;
            case 2: System.out.print("paper ");
        }
        if (computer == user)
            System.out.println(" too. It is a draw");
        else
        {
            boolean win = (user == 0 && computer == 2) || (user == 1 && computer == 0) ||
                          (user == 2 && computer == 1);
            if (win)
                System.out.println(". You won");
            else
                System.out.println(". You lose");
        }
    }
}
```

15. Write a program that prompts the user to enter a point (x, y) and checks whether the point is within the circle centered at (0, 0) with radius 10. For example, (4, 5) is inside the circle and (9, 9) is outside the circle.

```
import java.util.Scanner;
```

```
public class A3Q15 {
	public static void main(String[] args) {
		Scanner input = new Scanner(System.in);
		System.out.print("Enter a point with two coordinates: ");
		double x = input.nextDouble();
		double y = input.nextDouble();
		double distance =  Math.pow(Math.pow(x, 2) + Math.pow(y, 2), 0.5;
		if (distance <= 10)
			System.out.println("Point lies in the circle");
		else
			System.out.println("Point does not lie in the circle");
	}
}
```

16. A University conducts a 100 mark exam for its student and grades them as follows. Assigns a grade based on the value of the marks. Write a java program to print the grade according to the mark secured by the student. [Use switch-case]

Mark Range	Letter Grade
>=90	O
>=80 AND <90	A
>=70 AND <80	B
>=60 AND <70	C
>=50 AND <60	D
>=40 AND <50	E
<40	F

```
import java.util.Scanner;
public class A3Q16 {
	public static void main(String[] args) {
		Scanner sc=new Scanner(System.in);
		System.out.println("Enter the marks of a student out of 100 full mark ");
		int mark=sc.nextInt();
		switch(mark/10)
		{
			case 0: case 1: case 2: case 3:
				System.out.println("F”);
			case 4:
				System.out.println("E”);
			case 5:
				System.out.println("D”);
			case 6:
				System.out.println("C”);
			case 7:
				System.out.println("B”);
			case 8:
				System.out.println("A”);
			case 9: case 10:
				System.out.println("O”);
			default:
				System.out.println("Invalid Input”);
		}
```

```
    }
}
```

17. Write a program that prompts the user to enter an integer and determines whether it is divisible by 5 and 6, whether it is divisible by 5 or 6, and whether it is divisible by 5 or 6, but not both.

```
import java.util.Scanner;
public class A3Q17 {
    public static void main(String[] args) {
        Scanner input = new Scanner(System.in);
        System.out.print("Enter an integer: ");
        int number = input.nextInt();
        if ((number % 5 == 0) && (number % 6 == 0))
            System.out.println("number divisible by 5 and 6");
        if ((number % 5 == 0) || (number % 6 == 0))
            System.out.println("number divisible by 5 or 6 ");
        if ((number % 5 == 0) ^ (number % 6 == 0))
            System.out.println("number divisible by 5 or 6 but not both”);
    }
}
```

18. Make a java program which displays an appropriate name for a person, using a combination of nested ifs and compound conditions. Ask the user for a gender, first name, last name and age. If the person is female and 20 or over, ask if she is married. If so, display "Mrs." in front of her name. If not, display "Ms." in front of her name. If the female is under 20, display her first and last name. If the person is male and 20 or over, display "Mr." in front of his name. Otherwise, display his first and last name. Note that asking a person if they are married should only be done if they are female and 20 or older, which means you will have a single if and else nested inside one of your if statements. Also, did you know that with an if statements (or else), the curly braces are optional when there is only one statement inside?

```
import java.util.Scanner;
public class A3Q18 {
    public static void main(String[] args) {
        Scanner sc=new Scanner(System.in);
        System.out.println("Enter the Gender (M/F) ");
        char g=sc.next().charAt(0);
        System.out.println("Enter First Name");
        String fn=sc.next();
        System.out.println("Enter last Name");
        String ln=sc.next();
        System.out.println("Enter Age");
        int age=sc.nextInt();
        if(g=='F')
         {
            if(age>=20)
             {
              System.out.println("Are you married"+fn+"(y or n)?");
                char m=sc.next().charAt(0);
                 if(m=='y')
                  System.out.println("Then I shall call you Mrs."+ fn+" "+ln);
                  else
```

```
                    System.out.println("Then I shall call you Ms."+ fn+" "+ln);
                }
                else
                    {
                    System.out.println("Then I shall call you "+ fn+" "+ln);
                    }
            }
            else
            {
               if(g=='M')
                  {
                  if(age>=20)
                  {
                    System.out.println("Then I shall call you Mr."+ fn+" "+ln);
                  }
                  else
                  {
                    System.out.println("Then I shall call you "+ fn+" "+ln);
                  }
            }
        }
    }
}
```