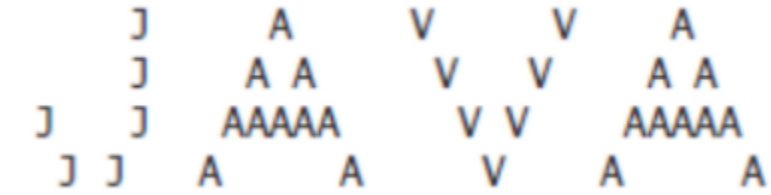
Lab Task - 1

1. Write a program that displays the following pattern:



A. Code:-

```
public class pattern
{
   public static void main(String[] args)
   {
      System.out.println("     J" + "     A" + "     V     V" + "     A");
      System.out.println("     J" + "    A A" + "     V   V" + "     A A");
      System.out.println("J    J" + "   AAAAA" + "     V V" + "     AAAAA");
      System.out.println(" J J" + "    A     A" + "     V" + "     A     A");
   }

}
```

SAMPLE INPUT AND SAMPLE OUTPUT:

```
Microsoft Windows [Version 10.0.22000.493]
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C:\Users\MOHITH>d:

D:\>cd java

D:\JAVA>javac pattern.java

D:\JAVA>java pattern
     J     A     V     V     A
     J    A A     V   V     A A
J    J   AAAAA     V V     AAAAA
 J J    A     A     V     A     A
```

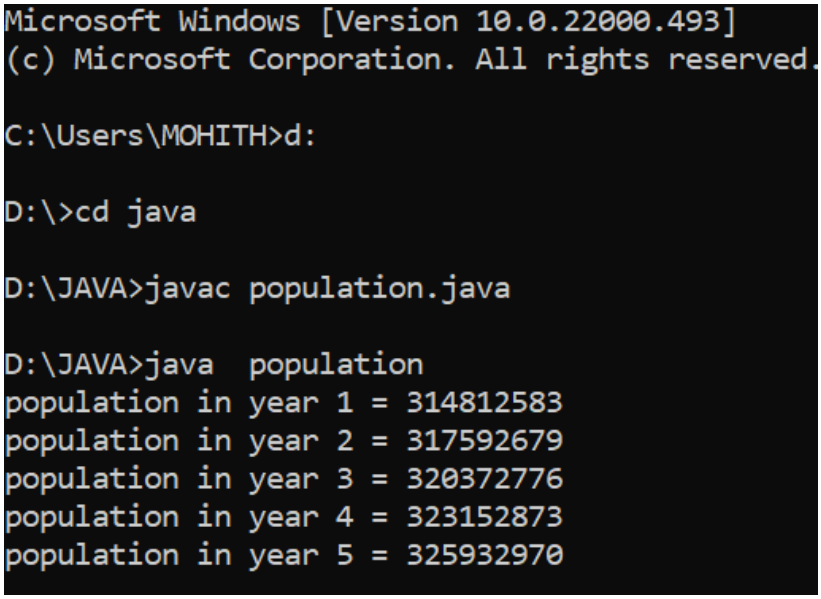
2. (Population projection) The U.S. Census Bureau projects population based on the following assumptions:
One birth every 7 seconds
One death every 13 seconds
One new immigrant every 45 seconds
Write a program to display the population for each of the next five years. Assume the current population is 312,032,486 and one year has 365 days. Hint: In Java, if two integers perform division, the result is an integer. The fractional part is truncated. For example, 5 / 4 is 1 (not 1.25) and 10 / 4 is 2 (not 2.5). To get an accurate result with the fractional part, one of the values involved in the division must be a number with a decimal point. For example, 5.0 / 4 is 1.25 and 10 / 4.0 is 2.5.

A. Code:-

```
public class population
{
   public static void main(String[] args)
   {
      double cp = 312032486;
      double birth = 7.0;
      double death = 13.0;
      double immigration = 45.0;
      double birthsPerYear = (60 * 60 * 24 * 365) / birth;
      double deathsPerYear = (60 * 60 * 24 * 365) / death;
      double immigrationPerYear = (60 * 60 * 24 * 365) / immigration;
      for (int i = 1; i <= 5; i++)
      {
       cp += birthsPerYear - deathsPerYear + immigrationPerYear;
          System.out.printf("population in year " + i + " = %1.0f\n",cp);
```

```
    }
  }
}
```

SAMPLE INPUT AND SAMPLE OUTPUT:



3. (Financial application: calculate tips) Write a program that reads the subtotal and the gratuity rate, then computes the gratuity and total. For example, if the user enters 10 for subtotal and 15% for gratuity rate, the program displays $1.5 as gratuity and $11.5 as total. Here is a sample run:

A. Code:-

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

```
        System.out.print("Enter the subtotal and a gratuity rate: ");
        double subtotal = sc.nextDouble();
        double per = sc.nextDouble();
        double gratuity = subtotal*(per/100);
        double total = subtotal + gratuity;
        System.out.printf("The gratuity is: $%.2f and total is: $" + total, gratuity);
    }
}
```

SAMPLE INPUT AND SAMPLE OUTPUT:

```
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C:\Users\MOHITH>d:

D:\>cd java

D:\JAVA>javac gratuity.java

D:\JAVA>java  gratuity
Enter the subtotal and a gratuity rate: 10 15
The gratuity is: $1.50 and total is: $11.5
```

4. (Sum the digits in an integer) Write a program that reads an integer between 0 and1000 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.

A. Code:-

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

```
   public static void main(String[] args)
   {
      System.out.print("Enter a number between 0 and 1000: ");
      Scanner sc = new Scanner(System.in);
      int n = sc.nextInt();
            int s = 0;
            while (n > 0)
            {
               s += (n % 10);
               n /= 10;
      }
      System.out.println("The sum of the digits is " + s);
         }
}
```

SAMPLE INPUT AND SAMPLE OUTPUT:

```
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C:\Users\MOHITH>d:

D:\>cd java

D:\JAVA>javac sum.java

D:\JAVA>java  sum
Enter a number between 0 and 1000: 999
The sum of the digits is 27
```

5. (Game: scissor, rock, paper) Write a program that plays the popular scissor-rockpaper 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.

A. Code:-

```
import java.util.Random;
import java.util.Scanner;
public class game
{
   public static void main(String[] args) {
      final int scissor = 0;
      final int rock = 1;
      final int paper = 2;
      Scanner sc = new Scanner(System.in);
      Random random = new Random();
      System.out.print("Scissor (0), rock (1), paper (2): ");
      int player = sc.nextInt();
      if (player == 0 || player == 1 || player == 2) {
         int computer = random.nextInt(3);
         switch (player) {
            case 0:
               if (computer == scissor)
               {
                                       System.out.println("It's a draw");
               }
               else if (computer == rock)
               {
                  System.out.println("You lost");
               }
               else if (computer == paper)
               {
                  System.out.println("You won");
               }
               break;
            case 1:
               if (computer == scissor)
               {
                  System.out.println("You won");
```

```
            }
            else if (computer == rock)
            {
               System.out.println("Its a draw");
            }
            else if (computer == paper)
            {
               System.out.println("You lost");
            }
            break;
         case 2:
            if (computer == scissor)
            {
               System.out.println("You lost");
            }
            else if (computer == rock)
            {
               System.out.println("You won");
            }
            else if (computer == paper)
            {
               System.out.println("It's a draw");
            }
            break;
      }
   }
   else
   {
      System.out.println("Computer has won because your input is an invalid input");
   }
  }
}
```

SAMPLE INPUT AND SAMPLE OUTPUT:

```
Microsoft Windows [Version 10.0.22000.493]
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C:\Users\MOHITH>d:

D:\>cd java

D:\JAVA>javac game.java

D:\JAVA>java  game
Scissor (0), rock (1), paper (2): 1
You lost
```

6. (*Geometry: point in a circle?*) 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, as shown in Figure 3.7a.

(*Hint*: A point is in the circle if its distance to (0, 0) is less than or equal to 10. The formula for computing the distance is $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$. Test your program to cover all cases.) Two sample runs are shown below.

A. Code:-

```
import java.lang.Math;
import java.util.Scanner;
public class circle
{
   public static void main(String[] args)
   {
      Scanner sc = new Scanner(System.in);
      System.out.print("Enter a point with two coordinates: ");
      double x2 = sc.nextInt();
      double y2 = sc.nextInt();
      double x1 = 0;
      double y1 = 0;
      double dist = Math.sqrt(Math.pow(x2 - x1, 2) + Math.pow(y2 - y1, 2));
      if (dist <= 10)
```

```
    {
      System.out.println("Point (" + x2 + ", " + y2 + ") " + "is in the circle");
    }
    else
    {
      System.out.println("Point (" + x2 + ", " + y2 + ") " + "is not in the circle");
    }
  }
}
```

SAMPLE INPUT AND SAMPLE OUTPUT:

```
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C:\Users\MOHITH>d:

D:\>cd java

D:\JAVA>javac circle.java

D:\JAVA>java  circle
Enter a point with two coordinates: 4 5
Point (4.0, 5.0) is in the circle
```

7. (Game: pick a card) Write a program that simulates picking a card from a deck of 52 cards. Your program should display the rank (Ace, 2, 3, 4, 5, 6, 7, 8, 9, 10, Jack, Queen, King) and suit (Clubs, Diamonds, Hearts, Spades) of the card.

A. Code:-

```
import java.util.Random;
public class card
{
  public static void main(String[] args)
  {
```

```
        int card = new Random().nextInt(12);
        int suit = new Random().nextInt(3);
            String[] suits = {"Clubs", "Diamonds", "Hearts", "Spades"};
        String[] cards = {"Ace", "2", "3", "4", "5", "6", "7", "8", "9", "10", "Jack", "Queen", "King"};
        System.out.println("The card you picked is " + cards[card] + " of " + suits[suit]);
    }
}
```

SAMPLE INPUT AND SAMPLE OUTPUT: