Experiment Number: 1 (Encapsulation: Classes and Objects)

Name	**Shreya Shetty**
UID	**2019140059**
Class	**TE IT**
Batch	**D**
Subject	**OOP Lab**

Aim: Write a program to print all Armstrong numbers and Prime Numbers in the range inputted by the user. Also print the total count of Prime Numbers in the given range. Use the concept of classes and objects.

Program:

```
import java.util.Scanner;
import java.io.*;
import java.lang.Math;
class armstrong
{
     //Function to calculate order of the number
     int order(int x)
     {
        int n = 0;
        while(x != 0)
        {
            n++;
            x = x / 10;
        }
        return n;
    }
    // Function to check whether the given number is Armstrong number or not
    public boolean isArmstrong(int x)
    {
        int n=order(x);   // Calling order function
        int temp=x, sum=0;
        while(temp != 0)
        {
            int r=temp%10;
            sum=sum+(int) Math.pow(r, n);
            temp=temp/10;
        }
        return (sum==x);  // If satisfies Armstrong condition
    }
}
class prime
{
    public boolean isPrime(int x)
    {
        // Corner case
        if (x<=1)
            return false;
        // Check from 2 to n-1
        for(int i=2; i<x; i++)
```

```
            if(x%i==0)
                return false;
        return true;
    }
}
public class armstrongPrime
{
    // Print Armstrong/Prime numbers between start and end
    void print(int start, int end, int choice)
    {
        int counter = 0;
        armstrong ar=new armstrong();
        prime pr=new prime();
        for(int i=start; i<=end; i++)
        {
            switch(choice)
            {
                case 1: //WHn Armstrong number is selected
                    if(ar.isArmstrong(i))
                    {
                        if(counter==0)
                        {
                            System.out.print("Armstrong Numbers in the range " + start + "
- " + end + " : ");
                        }
                        System.out.print(i + "  ");
                        counter++;
                    }
                    break;

                case 2: //When Prime number is selected
                    if(pr.isPrime(i))
                    {
                        if(counter==0)
                        {
                            System.out.print("Prime Numbers int he range " + start + " -
" + end + " : ");
                        }
                        System.out.print(i + "  ");
                        counter++;
                    }
                    break;
            }
        }
        System.out.print("\nIn the range "+start+" - "+end+", there are "+counter);
        if(choice==1)
            System.out.print(" Armstrong Numbers\n");
        else
            System.out.print(" Prime Numbers\n");
    }
    // Driver Program
    public static void main(String[] args) throws Exception {
        armstrongPrime ob = new armstrongPrime();
        Scanner sc = new Scanner(System.in);
        int choice;
        while(true)
        {
```

```
            System.out.print("\nEnter\t1.Armstrong\n\t2. Prime No.\n\t3. Exit\nYour Choic
e : ");
            choice = sc.nextInt();
            if(choice==3)
            {
                    System.out.println("Exit Selected\n");
                    break;
            }
            if(choice!=2 && choice!=1)
            {
                System.out.println("Invalid Input\n");
                continue;
            }
            System.out.print("Enter the start of the range : ");
            int start = sc.nextInt();
            System.out.print("Enter the end of the range : ");
            int end = sc.nextInt();
            if(end<=start)
            {
                System.out.println("Invalid Range\n");
                continue;
            }
            ob.print(start, end, choice);
        }
        sc.close();
    }
}
```

Output:

```
PS D:\PROJECT_AND_CODES\Java> cd "d:\PROJECT_AND_CODES\Java\" ; if ($?) { javac armstrongPrime.java } ; if ($?) { java armstrongPrime }

Enter   1.Armstrong
        2. Prime No.
        3. Exit
Your Choice : 1
Enter the start of the range : 1
Enter the end of the range : 200
Armstrong Numbers in the range 1 - 200 : 1  2  3  4  5  6  7  8  9  153
In the range 1 - 200, there are 10 Armstrong Numbers

Enter   1.Armstrong
        2. Prime No.
        3. Exit
Your Choice : 2
Enter the start of the range : 50
Enter the end of the range : 100
Prime Numbers int he range 50 - 100 : 53  59  61  67  71  73  79  83  89  97
In the range 50 - 100, there are 10 Prime Numbers

Enter   1.Armstrong
        2. Prime No.
        3. Exit
Your Choice : 4
Invalid Input


Enter   1.Armstrong
        2. Prime No.
        3. Exit
Your Choice : 2
Enter the start of the range : 60
Enter the end of the range : 50
Invalid Range


Enter   1.Armstrong
        2. Prime No.
        3. Exit
Your Choice : 3
Exit Selected

PS D:\PROJECT_AND_CODES\Java>
```