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Experiment No.	**1**

AIM:	**Program on Encapsulation: To write a program to demonstrate classes and objects**
Program 1	
PROBLEM STATEMENT :	**Write a program using classes and objects to print all even and odd numbers in the range of 1-100 as well as the total number of even and odd numbers in the given range.** **As an extra, the range may be inputted from the user.** **Use the concept of classes and objects.**
PROGRAM:	**import java.util.Scanner;** **class NumberFinder** **{** **int start, end;** **NumberFinder (int start, int end)** **{** **this.start = start;** **this.end = end;** **}** **boolean checkEven (int x)** **{** **return (x%2==0);** **}** **void print ()** **{** **int ocount = 0;** **int ecount = 0;** **System.out.println ("Even numbers in the range " + start**

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+ " to " + end + ":");
                for (int i = start; i <= end; i++)
                {
                        if (checkEven(i))
                        {
                                System.out.print (i + " ");
                                ecount++;
                        }
                }
                System.out.println ("\nOdd numbers in the range " +
start + " to " + end + ":");
                for (int i = start; i <= end; i++)
                {
                        if (!checkEven(i))
                        {
                                System.out.print (i + " ");
                                ocount++;
                        }
                }
                System.out.println ("\nTotal number of even numbers in
the range is: " + ecount);
                System.out.println ("Total number of odd numbers in
the range is: " + ocount);
        }
}
class OddEven
{
        public static void main (String[] args)
        {
                Scanner input = new Scanner (System.in);
                System.out.print ("Enter the starting range: ");
                int startRange = input.nextInt ();
                System.out.print ("Enter the ending range: ");
                int endRange = input.nextInt ();
                NumberFinder a = new NumberFinder (startRange,
endRange);
                a.print();
                input.close ();
        }
}
```

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psipl@psipl-OptiPlex-3000:~/Desktop/2023300065$ javac OddEven.java
psipl@psipl-OptiPlex-3000:~/Desktop/2023300065$ java OddEven
Enter the starting range: 1
Enter the ending range: 100
Even numbers in the range 1 to 100:
2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56
58 60 62 64 66 68 70 72 74 76 78 80 82 84 86 88 90 92 94 96 98 100
Odd numbers in the range 1 to 100:
1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47 49 51 53 55 5
7 59 61 63 65 67 69 71 73 75 77 79 81 83 85 87 89 91 93 95 97 99
Total number of even numbers in the range is: 50
Total number of odd numbers in the range is: 50
psipl@psipl-OptiPlex-3000:~/Desktop/2023300065$
```

RESULT:

Program 2	
PROBLEM STATEMENT :	**Write a program to find all prime numbers in the given range. Print the prime numbers and total number of prime numbers in the range. Use the concept of class and objects.**

PROGRAM:	import java.util.Scanner;
	class NumberFinder
	{
	int start, end;
	NumberFinder (int start, int end)
	{
	this.start = start;
	this.end = end;
	}
	int checkPrime (int x)
	{
	int c = 0;
	if (x==1)
	return 1;
	else
	{
	for (int i = 2; i < x; i++)
	{
	if (x%i==0)

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                                        c++;
                        }
                        return c;
                }
        }
        void print ()
        {
                int pcount = 0;
                System.out.println ("Prime numbers in the range " + start + "
to " + end + ":");
                for (int i = start; i <= end; i++)
                {
                        if (checkPrime(i)==0)
                        {
                                System.out.print (i + " ");
                                pcount++;
                        }
                }
                System.out.println ("\nTotal number of prime numbers in the
range is: " + pcount);
        }
}
class Prime
{
        public static void main (String[] args)
        {
                Scanner input = new Scanner (System.in);
                System.out.print ("Enter the starting range: ");
                int startRange = input.nextInt ();
                System.out.print ("Enter the ending range: ");
                int endRange = input.nextInt ();
                NumberFinder a = new NumberFinder (startRange,
endRange);
                a.print();
                input.close ();
        }
}
```

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psipl@psipl-OptiPlex-3000:~/Desktop/2023300065$ javac Prime.java
psipl@psipl-OptiPlex-3000:~/Desktop/2023300065$ java Prime
Enter the starting range: 1
Enter the ending range: 300
Prime numbers in the range 1 to 300:
2 3 5 7 11 13 17 19 23 29 31 37 41 43 47 53 59 61 67 71 73 79 83 89 97 101 103 107 109 113
 127 131 137 139 149 151 157 163 167 173 179 181 191 193 197 199 211 223 227 229 233 239 2
41 251 257 263 269 271 277 281 283 293
Total number of prime numbers in the range is: 62
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```

RESULT:

Program 3	
PROBLEM STATEMENT:	**Write a program to print all Armstrong numbers in the range inputted by the user. Also print the total count of Armstrong numbers in the range.** **Use the concept of classes and objects.**

PROGRAM:	import java.util.Scanner;
	import java.lang.*;
	class NumberFinder
	{
	int start, end;
	NumberFinder (int start, int end)
	{
	this.start = start;
	this.end = end;
	}
	int Digit (int x)
	{
	int dig = 0;
	while (x!=0)
	{
	x/=10;
	dig++;
	}
	return dig;
	}
	int checkArmstrong (int x)
	{
	int d,s=0,t=x;
	while (x!=0)

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                {
                        d = x%10;
                        s+=Math.pow (d,Digit(t));
                        x/=10;
                }
                if (s==t)
                        return 1;
                else
                        return 0;
        }
        void print ()
        {
                int acount = 0;
                System.out.println ("Armstrong numbers in the range " +
start + " to " + end + ":");
                for (int i = start; i <= end; i++)
                {
                        if (checkArmstrong(i)==1)
                        {
                                System.out.print (i + " ");
                                acount++;
                        }
                }
                System.out.println ("\nTotal number of Armstrong numbers
in the range is: " + acount);
        }
}
class Armstrong
{
        public static void main (String[] args)
        {
                Scanner input = new Scanner (System.in);
                System.out.print ("Enter the starting range: ");
                int startRange = input.nextInt ();
                System.out.print ("Enter the ending range: ");
                int endRange = input.nextInt ();
                NumberFinder a = new NumberFinder (startRange,
endRange);
                a.print();
                input.close ();
```

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        }
}
```

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psipl@psipl-OptiPlex-3000:~/Desktop/2023300065$ javac Armstrong.java
psipl@psipl-OptiPlex-3000:~/Desktop/2023300065$ java Armstrong
Enter the starting range: 1
Enter the ending range: 200
Armstrong numbers in the range 1 to 200:
1 2 3 4 5 6 7 8 9 153
Total number of Armstrong numbers in the range is: 10
psipl@psipl-OptiPlex-3000:~/Desktop/2023300065$
```

RESULT:

CONCLUSION:	**This experiment helped me to understand the basics of a class and objects. We learnt how to create a constructor of a class to enable creating an object of it which would be used to call methods. Obviously the logic of odd and even numbers, prime and Armstrong and the use of a counter to count the number of times it appears was used. We also understood how to create a Scanner class to take inputs from the user. An intriguing error appeared wherein 1 was identified as a prime number so I also learnt how to combat that. Using power function was also learnt and how to input java.lang package.**