

Experiment number 1 b

Aim: A Mersenne prime is a prime number that has the form $2^p - 1$ where p is a positive number greater than 1. Write a program that calculates candidate Mersenne primes $2^p - 1$ for $2 \leq p \leq 31$ using multiple classes and objects. Then test the number to see if it is prime. If you detect that the number is prime, print out the number and the value of p .

Theory: A Mersenne prime is a prime number that has the form $2^p - 1$ where p is a positive number greater than 1.

Algorithm:

- 1) public class mersenne
- 2) public static void main
- 3) create an object u of checkPrime and an object v of Print
- 4) for(int $p=2$; $p \leq 31$; $p++$){ double $l=2^p-1$
- 5) int $x=u.prime(l)$ and $v.print(x,l)$
- 6) inside class checkPrime, theres a function prime(double a)
- 7) for(int $i=2$; $i \leq \text{sqrt of } a$; $i++$) and if($a \% i == 0$), then return 0, else continue
- 8) if the loop runs completely, then return 1 which means its a prime number
- 9) inside class Print, there a function prime(int x , double l){ if $x==1$, then l is a mersenne number and print it.}

Code:

```
import java.util.*;
import java.lang.*;

public class mersenne{
    public static void main(String args[]){
        checkPrime u= new checkPrime();
        Print v= new Print();
        for(int p=2;p<=31;p++){
            double l=(double)Math.pow(2,p)-1;
            int x=u.prime(l);
            v.print(x,l);
        }
    }
}

class checkPrime{
    public static int prime(double a){
```

```

        int r=(int)Math.sqrt(a);
        for(int i=2;i<=r;i++){
            if(a%i==0){
                return 0;
            }
        }
        return 1;
    }
}

class Print{
    public static void print(int x, double l){
        if(x==1){
            System.out.println(l+" is a mersenne number");
        }
    }
}

```

Output:

```

3.0 is a mersenne number
7.0 is a mersenne number
31.0 is a mersenne number
127.0 is a mersenne number
8191.0 is a mersenne number
131071.0 is a mersenne number
524287.0 is a mersenne number
2.147483647E9 is a mersenne number

```

Conclusion:

By writing this code, I learnt how I could use different classes and functions within them to perform different operations. Here, I created one class for taking an input, another class for checking whether the number is prime or not, and a third class just for printing.