6. Magic (Special) Numbers

6.1 Amicable numbers

```java
import java.util.Scanner;

public class AmicableNumber {
    public static void main (String args[]) {
        Scanner scan = new Scanner (System.in);
        System.out.print ("Enter 1st number: ");
        int num1 = scan.nextInt();
        System.out.print ("Enter 2nd number: ");
        int num2 = scan.nextInt();
        scan.close();

        int SOD_num1 = 0, SOD_num2 = 0;

        for (int i = 1; i<num1 || i<num2; i++) {
            if (i!= num1 && i!=num2) {
                if (i<num1 && num1%i == 0) {
                    SOD_num += i;
                }
                if (i<num2 && num2% i == 0) {
                    SOD_num2 += i;
                }
            }
        }

        if (SOD_num1 == num2 && SOD_num2 == num1) {
            System.out.println("The numbers are amicable numbers.");
        } else {
            System.out.println("The numbers are not amicable numbers.");
        }
    }
}
```

output:
```
Enter 1st number: 284
Enter 2nd number: 220
The numbers are amicable numbers.
```

6.2 Armstrong number

```java
import java.util.Scanner;
import java.lang.Math;

public class ArmstrongNumber {
    public static void main (String args[]) {
        Scanner scan = new Scanner(System.in);
        System.out.print ("Enter number = ");
        int num = scan.nextInt();

        int sumOfPowerOfDigits = 0, dig, count = 0;

        for (int i = num; i > 0; i /= 10) { count += 1; }

        for (int i = num; i > 0; i /= 10) {
            dig = i % 10;
            sumOfPowerOfDigits += Math.pow (dig, count);
        }

        if (sumOfPowerOfDigits == num) {
            System.out.print (num + " is an Armstrong number");
        } else {
            System.out.print (num + " is not an Armstrong number");
        }
    }
}
```

output :

```
Enter number = 145
145 is not an Armstrong number

Enter number = 153
153 is an Armstrong Number
```

6.3 Capricorn Number

```java
import java.util.Scanner;
import java.lang.Math;

public class CapricornNumber {
    public static void main (String args[]) {
        Scanner scan = new Scanner (System.in);
        System.out.print ("Enter a number: ");
        int num = scan.nextInt();

        int squareOfNum = num * num, count = 0;
        boolean check = true;

        for (int i = squareOfNum; i > 0; i /= 10 ) { count += 1; }

        for (int i = 1; i < count; i++ ) {
            int divisor = (int) Math.pow (10, i);
            int firstPart = squareOfNum / divisor;
            int secondPart = squareOfNum % divisor;

            if (firstPart + secondPart == num) {
                System.out.println (num + "is a capricorn number");
                check = true;
                break;
            } else {
                check = false;
            }
        }
        if (!check) {
            System.out.println (num + "is not a capricorn number");
        }
    }
}
```

output :   Enter a number: 297

297 is a capricorn number

6.4 Circular Prime

```java
import java.util.Scanner;
import java.lang.Math;
public class CircularPrime {
    public static void main (String args[]) {
        Scanner scan = new Scanner (System.in);
        System.out.print ("Enter a number: ");
        int input = scan.nextInt ();

        int count = 0, rem, num = input;
        boolean check = true;

        for (int i = num; i > 0; i /= 10) { count ++; }
        for (int i = 1; i <= count; i++) {
            rem = num % 10;
            num /= 10;
            num = (rem * (int) Math.pow (10, count - 1)) + num;

            if (!checkPrime (num)) {
                check = false;
                break;
            }
        }
        if (check) {
            System.out.println (input + " is a circular Prime ");
        } else {
            System.out.println (input + " is not a circular Prime");
        }
    }
    public static boolean checkPrime (int n) {
        boolean bool = false;
        for (int i = 2; i < n; i++) {
            if (n % i == 0) { bool = false; break; }
            else { bool = true; }
        }
        return bool;
    }
}
```

5/16

Output :

Enter a number : 1193

1193 is a Circular Prime

6.5 Happy Number

```java
import java.util.Scanner;
public class HappyNumber{
    public static void main (String args[]){
        Scanner scan = new Scanner (System.in);
        System.out. print ("Enter a number : ");
        int input = scan.nextInt();

        int sumOfSquareOfDig = 0, dig, num = input;
        boolean check = false;

        while (true){
            for ( int i = num ; i>0 ; i/= 10 ){
                dig = i % 10;
                sumOfSquareOfDigt= dig*dig;
            }
            if (sumOfSquareOfDig < 10){
                if ( sumOfSquareOfDig == 1){
                    check = true;
                    break;
                } else {
                    check = false;
                    break;
                }
            }
            num = sumOfSquareOfDig;
            sumOfSquareOfDig = 0;
        }
        if (check){
            System.out.println (input + " is a Happy Number ");
        } else { System.out.println(input + " is not a Happy number );}
    }
}
```

Output :

Enter a number: 32

32 is a Happy Number

6.6 Automorphic Number

```java
import java.util.Scanner;
public class AutomorphicNumber {
    public static void main(String args[]){
        Scanner scan = new Scanner(System.in);
        System.out.print("Enter a number: ");
        int num = scan.nextInt();
        scan.close();

        int square = num * num;
        int lastDignum = num % 10;
        int lastDigSquare = square % 10;

        if (lastDignum == lastDigSquare){
            System.out.println(num + " is an Automorphic Number");
        } else {
            System.out.println(num+ " is not an Automorphic Number");
        }
    }
}
```

output:

Enter a number: 25
25 is an Automorphic Number

6.7 Disarium Number

```java
import java.util.Scanner;
import java.lang.Math;

public class DisariumNumber {
    public static void main (String args[]){
```

```
Scanner  scan  =  new Scanner (Systme.in);
System.out.print ("Enter a number: ");
int input = scan.nextInt();
scan.close();

int num = input, count = 0, dig, sumOfPowers = 0;

for (int i=num; i>0; i/= 10) { count ++; }

for (int i= count; i>0; i--) {
    dig = num% 10;
    sumOfPowers += Math.pow (dig, i);
    num /= 10;
}

if (sumOfPowers == input) {
    System.out.println (input + " is a Disarium Number");
} else {
    System.out.println (input + " is not a Disarium Number");
}}
```

Output :

Enter a number: 135
135 is a Disarium Number

6.8 Magic Number

```
import java.util.Scanner;
public class MagicNumber {
    public static void main(String args[]) {
        Scanner scan = new Scanner (System.in);
        System.out.print ("Enter a number: ");
        int input = scan.nextInt();
        scan.close();

        int sumOfDigits = 0, dig, num = input;
```

```
do {
    SumOfDigits = 0;
    for (int i = num; i > 0; i /= 10) {
        dig = i % 10;
        SumOfDigits += dig;
    }
    num = SumOfDigits;
} while (SumOfDigits >= 10);

if (SumOfDigits == 1) {
    System.out.println(input + "is a Mgic Number");
} else {
    System.out.println(input + " is not a Magic Number");
}
}
}
```

Output :

```
Enter a number: 226
226 is a Magic Number
```

6.9 Neon Number

```
import java.util.Scanner;
public class NeonNumber {
    public static void main (String args[]) {
        Scanner scan = new Scanner(System.in);
        System.out.print ("Enter a number: ");
        int num = scan.nextInt();
        scan.close();

        int square = num * num, dig, sumOfDig = 0;
```

```
for (int i = square; i>0 ; i/= 10 ){
     dig =  i % 10;
     Sum Of Dig += dig;
}
if (sum Of Dig == num){
     System.out.println (num + "  is  a  Neon  Number ");
} else {
     System.out.println (num + " is  not a  Neon Number");
}
}
}
```

output :

Enter a number: 9

9 is a Neon Number

6.10 Palindromic Number

```
import java.util.Scanner;
public class PalindromicNumber {
    public static void main (String args[]){
        Scanner scan = new Scanner (System.in);
        System.out.print ("Enter a number: ");
        int num = scan.nextInt();
        scan.close();

        int dig, rev = 0;

        for (int i = num; i>0; i/= 10){
            dig = i % 10;
            rev = rev*10 +dig;
        }
```

```
if (num == rev) {
    System.out.println (num + " is a Palindromic Number ");
} else {
    System.out.println (num + " is not a Palindromic Number ");
}}}
```

output:

Enter a number: 16461

16461 is a Palindromic Number

6.11 Perfect Number

```
import java.util.Scanner;
public class PerfectNumber {
    public static void main (String args[]) {
        Scanner scan = new Scanner (System.in);
        System.out.print ("Enter a number: ");
        int num = scan.nextInt();

        int sumOfDivisors = 0;
        for (int i = 1; i <= num/2 ; i++) {
            if (num % i == 0) {
                sumOfDivisors += i;
            }
        }
        if (sumOfDivisors == num) {
            System.out.println (num + " is a Perfect Number");
        } else {
            System.out.println (num + " is not a Perfect Number");
        }
    }
}
```

output:

Enter a number : 6

6 is a perfect number

6.12 Special Number

```java
Import java.util. Scanner;

public st clau specialNumber {
    public static void main (String avss []){
        Scanner scan = new Scanner (System.in);
        System.out.print ("Enter a number: ");
        int num = scan.nextInt();

        int dig, sumOfFactorialOfDig = 0;

        for (int i = num; i>0; i/= 10){
            dig = i % 10;
            sumOfFactorialOfDigt= factorial (dig);
        }
        if (sumoffactorialOfDig == num){
            System.out.println (num + " is a special Number");
        } else {
            System.out.println (num + " is not a special Number");
        }
    }

    public static int factorial (int n){
        int factorial = 1;
        for (int i = n; i>0; i--){
            factorial *= i;
        }
        return factorial;
    }
}
```

output:

Enter a number: 145

145 is a special Number

6.13   Spy Number

```java
import    java.util.Scanner;

public    class SpyNumber {
     public   static  void  main (String args[]) {
          Scanner  scan  =   new   Scanner (System.in);
          System.out.print (" Enter  a  number: ");
          int  num  =  scan.nextInt();
          scan.close();

          int   sumOfDigits = 0,  productOfDigs = 1 , dig;

          for (int i = num;  i>0;  i /= 10 ) {
              dig  = i % 10;
              sumOfDigits  += dig;
              productOfDigs  *= dig;
          }

          if (sumOfDigits == productOfDigits ) {
              System.out.println (num + " is a Spy Number ");
          } else {
              System.out.println (num + " is not a Spy Number");
          }
     }
}
```

Output:

Enter a number: 1124

1124 is a Spy Number

6.14 Ugly Number

```java
import java.util.Scanner;
public class UglyNumber {
    public static void main (String args[]){
        Scanner scan = new Scanner (System.in);
        System.out.print ("Enter a number: ");
        int input = scan.nextInt();

        int num = input;
        boolean check = true;
        while (num != 1){
            if (num%5 == 0) { num /= 5; }
            else if (num%3 ==0) { num /= 3; }
            else if (num%2 ==0) { num /= 2; }
            else {
                check = false;
                break;
            }
        }
        if (check) {
            System.out.println(input + " is an Ugly Number");
        } else {
            System.out.println(input + " is not an Ugly Number");
        }
    }
}
```

output:

Enter a number: 6
6 is an Ugly Number