JAVA Practical

PRACTICAL 1
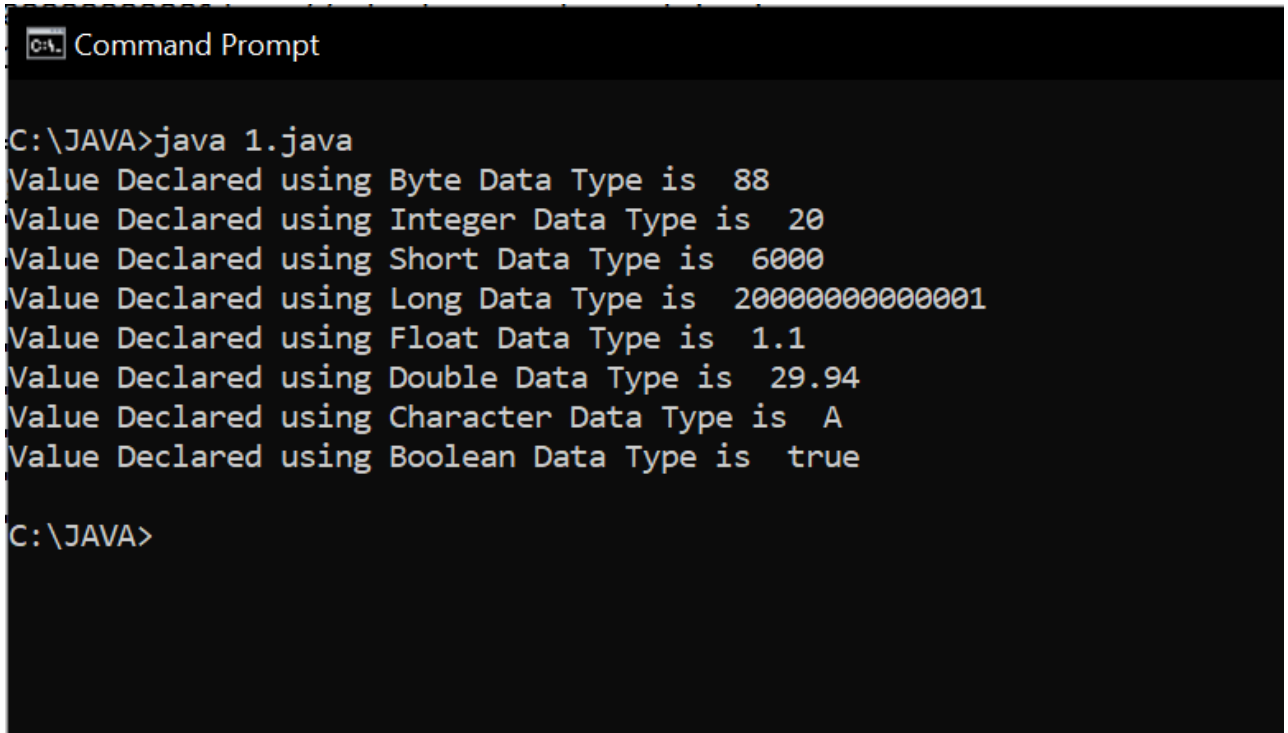
1) WAP to print Hello World and your name in a new line

```
public class Main {

        public static void main(String[] args) {

                System.out.println("Hello World");

                System.out.println("My name is AFTAB SAMA");

        }

}
```

```
Command Prompt

C:\JAVA>java 1.java
Hello World
My name is AFTAB SAMA

C:\JAVA>
```

2) WAP to use primitive datatypes in Java

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

byte byteData= 88;    //declaring byte data type
int intData= 20;     // declaring integer data type
short shortData= 6000;    //declaring short data type
long longData = 200000000000011;  // declaring long data type
float floatdata= 1.1f;   // declaring float data type
double doubleData = 29.94d;    // declaring double data type
boolean booleanData= true;  //declaring boolean data type
char charData = 'A';     // declaring character data type
System.out.println("Value Declared using Byte Data Type is  " + byteData);
System.out.println("Value Declared using Integer Data Type is  " + intData);
System.out.println("Value Declared using Short Data Type is  " + shortData);
System.out.println("Value Declared using Long Data Type is  " + longData);
System.out.println("Value Declared using Float Data Type is  " + floatdata);
System.out.println("Value Declared using Double Data Type is  " +
doubleData);
System.out.println("Value Declared using Character Data Type is  " +
charData);
System.out.println("Value Declared using Boolean Data Type is  " +
booleanData);

}
}
```

```
Command Prompt

C:\JAVA>java 1.java
Value Declared using Byte Data Type is  88
Value Declared using Integer Data Type is  20
Value Declared using Short Data Type is  6000
Value Declared using Long Data Type is  20000000000001
Value Declared using Float Data Type is  1.1
Value Declared using Double Data Type is  29.94
Value Declared using Character Data Type is  A
Value Declared using Boolean Data Type is  true

C:\JAVA>
```

3) WAP to use arithmetic operators in Java

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

   // declare variables
   int a = 12, b = 5;

    System.out.println(" a = 12, b = 5 ");
   // addition operator
   System.out.println("a + b = " + (a + b));

   // subtraction operator
```
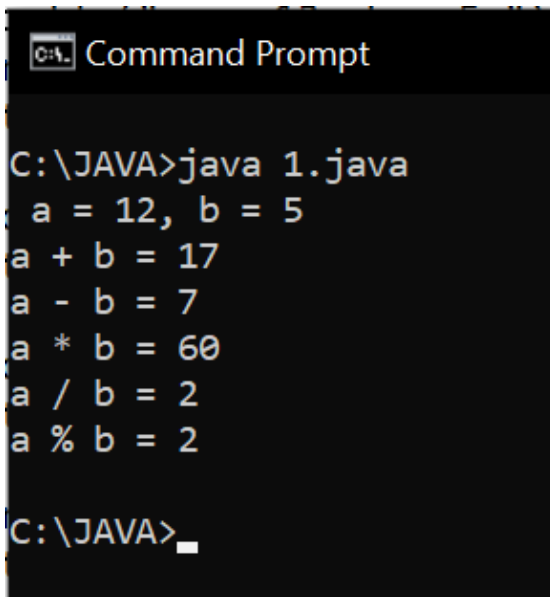
```
System.out.println("a - b = " + (a - b));


   // multiplication operator
   System.out.println("a * b = " + (a * b));


   // division operator
   System.out.println("a / b = " + (a / b));


   // modulo operator
   System.out.println("a % b = " + (a % b));
 }
}
```


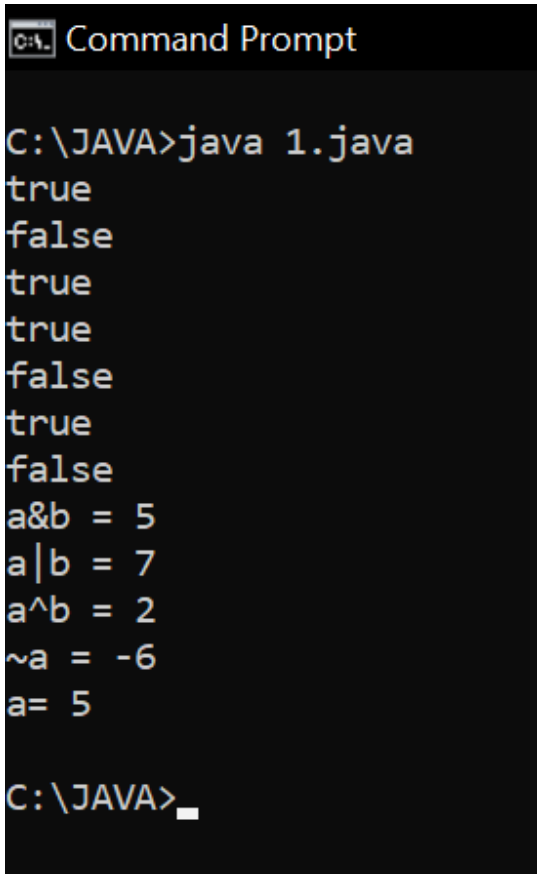4) Write a program to use logical & bitwise operators in Java

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

   // && operator
   System.out.println((5 > 3) && (8 > 5));  // true
   System.out.println((5 > 3) && (8 < 5));  // false


   // || operator
   System.out.println((5 < 3) || (8 > 5));  // true
   System.out.println((5 > 3) || (8 < 5));  // true
   System.out.println((5 < 3) || (8 < 5));  // false


   // ! operator
   System.out.println(!(5 == 3));  // true
   System.out.println(!(5 > 3));  // false


    int a = 5;
      int b = 7;

      // bitwise and
      // 0101 & 0111=0101 = 5
      System.out.println("a&b = " + (a & b));


      // bitwise or
      // 0101 | 0111=0111 = 7
      System.out.println("a|b = " + (a | b));
```

```
        // bitwise xor
        // 0101 ^ 0111=0010 = 2
        System.out.println("a^b = " + (a ^ b));


        // bitwise not
        // ~0101=1010
        // will give 2's complement of 1010 = -6
        System.out.println("~a = " + ~a);


        // can also be combined with
        // assignment operator to provide shorthand
        // assignment
        // a=a&b
        a &= b;
        System.out.println("a= " + a);



    }
}
```

```
Command Prompt

C:\JAVA>java 1.java
true
false
true
true
false
true
false
a&b = 5
a|b = 7
a^b = 2
~a = -6
a= 5

C:\JAVA>
```

5) WAP to use relational operators

```java
class Main {
 public static void main(String[] args) {
   int a = 7, b = 11;
   System.out.println("a is " + a + " and b is " + b);


   // == operator
   System.out.println(a == b);  // false
```

```
  // != operator
  System.out.println(a != b);  // true


  // > operator
  System.out.println(a > b);  // false


  // < operator
  System.out.println(a < b);  // true


  // >= operator
  System.out.println(a >= b);  // false


  // <= operator
  System.out.println(a <= b);  // true
 }
}
```
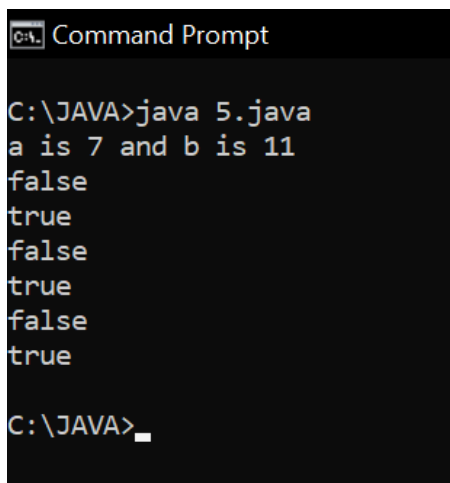
```
Command Prompt

C:\JAVA>java 5.java
a is 7 and b is 11
false
true
false
true
false
true

C:\JAVA>_
```

6) WAP to use Ternary operator & show the short circuit operators working

import java.util.Scanner;

```java
public class Ternary {
        public static void main(String[] args) {
                Scanner sc= new Scanner(System.in);
                System.out.println("a= ");
                int a=sc.nextInt();
                System.out.println("b= ");
                int b=sc.nextInt();
                int c=(a>b) ? a-b : b-a ;
                System.out.println("sub="+c);

 if (false && true && true) {
        System.out.println("This output will not be printed");
    }
    else {


        System.out.println("This output got printed actually,  due to AND(&&)
Operator short circuit");
    }
 if (true || false || false) {
        System.out.println(" This output got printed actually,  due to OR(||)
Operator short circuit");
    }
    else {
```
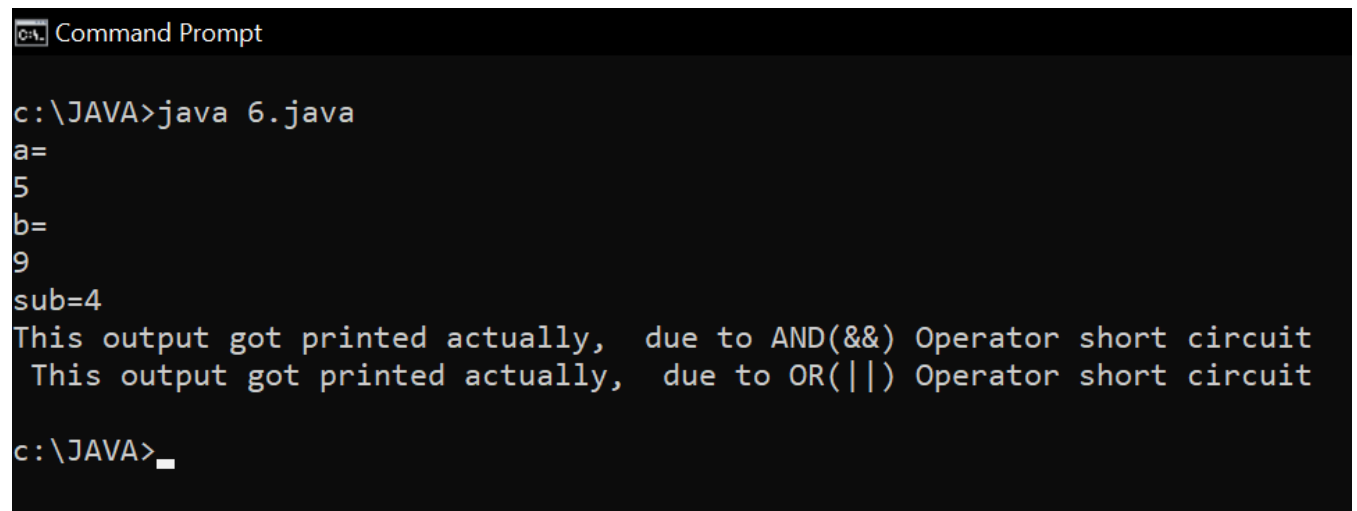
```
        System.out.println("This output will not be printed");

    }




        }

}
```

```
Command Prompt

c:\JAVA>java 6.java
a=
5
b=
9
sub=4
This output got printed actually,  due to AND(&&) Operator short circuit
 This output got printed actually,  due to OR(||) Operator short circuit

c:\JAVA>
```

PRACTICAL 2

1) Write a program to display a following pattern.

```
    *
  *  *
*  *  *
```

```java
import java.util.Scanner;

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

                int i,j,k,n;
                Scanner sc=new Scanner(System.in);
                System.out.println("n=");
                n=sc.nextInt();

                for(i=0;i<=n;i++){

                        for(j=0;j<n-i;j++){
                                System.out.print(" ");
                        }
                        for(k=i;k>0;k--){
                        System.out.print("* ");
```
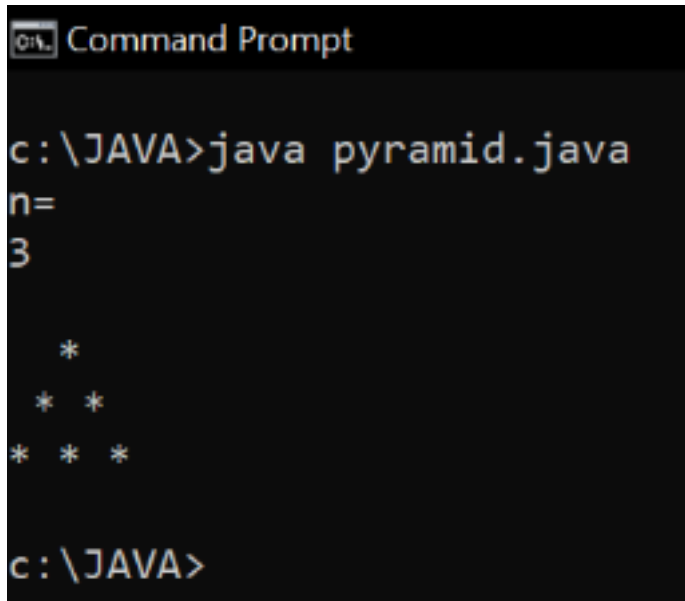
```
        }
        System.out.println( " ");
        }
}
}
```


2)Convert decimal number to binary number

```
import java.util.Scanner;

public class Main {
        public static void main(String[] args) {
                int i,j,d,k,b;
                Scanner sc=new Scanner(System.in);

                System.out.println(" Enter decimal number =");
```
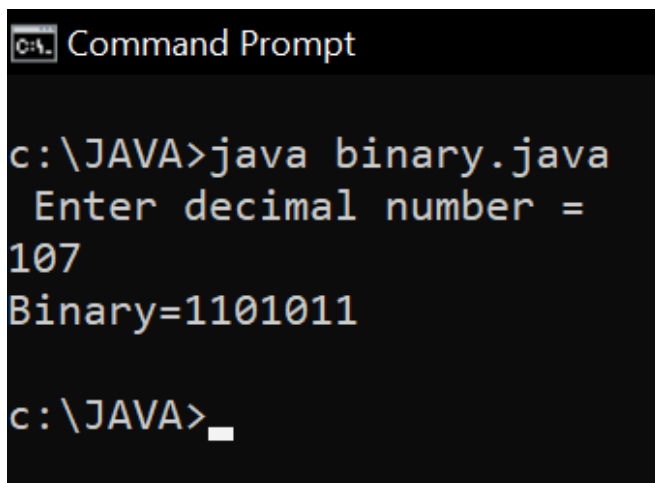
```
d=sc.nextInt();

b=0;

for(i=1;d>=1;i=i*10){

    j=d%2;
    d=d/2;
    b=b+(i*j);

}

System.out.println("Binary="+b);

    }
}
```


3)To compute the sum of digits of an integer

```java
import java.io.*;
import java.util.Scanner;

class digitsum {


   static int getSum(int n)
   {
      int sum = 0;


      while (n != 0) {
         sum = sum + n % 10;
         n = n / 10;
      }
       System.out.println("Sum of Digits = ");
      return sum;
   }


   public static void main(String[] args)
   {

      Scanner sc= new Scanner(System.in);
              System.out.println("a= ");
              int a=sc.nextInt();
```
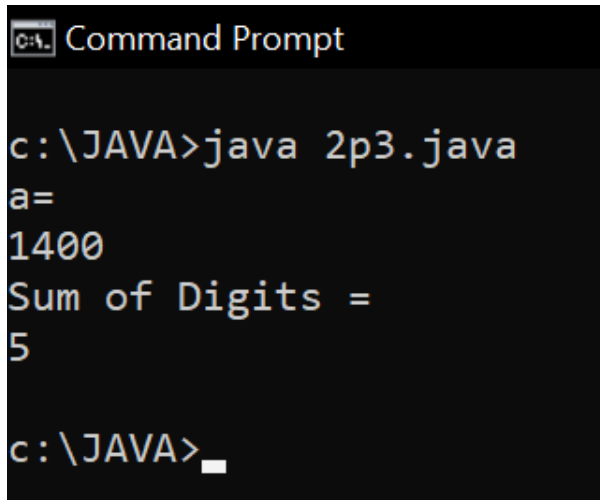
```
        System.out.println(getSum(a));

    }

}
```
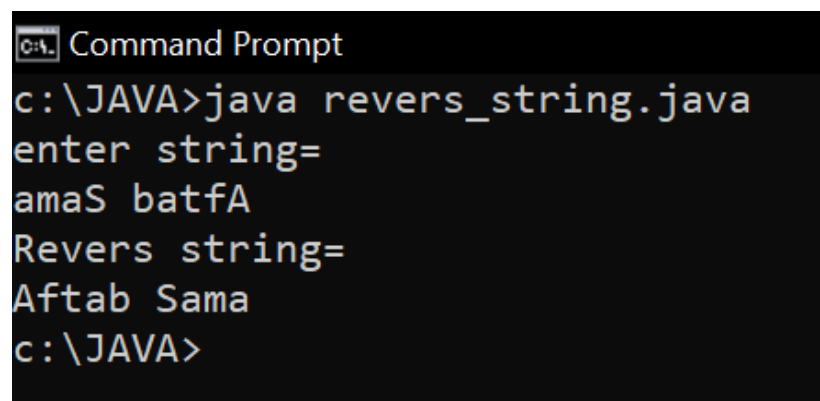
```
Command Prompt

c:\JAVA>java 2p3.java
a=
1400
Sum of Digits =
5


c:\JAVA>_
```

4)WAP to reverse a string

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


                Scanner sc=new Scanner(System.in);
                String s1;
                int i=0,n;
                System.out.println("enter string= ");
                s1=sc.nextLine();
                n=s1.length();
                char[]a= new char[n];
                for(i=0;i<n;i++)
```

```
        {

                a[i]=s1.charAt(i);


        }
    System.out.println("Revers string= ");
        for(int j=n-1;j>=0;j--)
        {
                System.out.print(a[j]);
        }




    }
}
```

```
Command Prompt
c:\JAVA>java revers_string.java
enter string=
amaS batfA
Revers string=
Aftab Sama
c:\JAVA>
```

5)WAP to count letters spaces number and other special characters

```
import java.util.*;
public class Main {
        public static void main(String[] args) {
                String s1;
                int i,s=0,c=0,sch=0,n=0;
                Scanner sc=new Scanner(System.in);
                System.out.println("enter string=");
                s1=sc.nextLine();
                for(i=0;i<s1.length();i++)
                {
                        if(s1.charAt(i)== ' '){ s++; }else
if(s1.charAt(i)>= 'a'&&s1.charAt(i)<='z'||s1.charAt(i)>=
'A'&&s1.charAt(i)<='Z'){ c++; }else   if(s1.charAt(i)>=
'0'&&s1.charAt(i)<='9'){ n++; }else{ sch++; }
                }
                System.out.println("number of space in string is "+s);
                System.out.println("number of character in string is "+c);
                System.out.println("number of special character in string is "+sch);
                System.out.println("number of digits in string is "+n);
        }
}
```
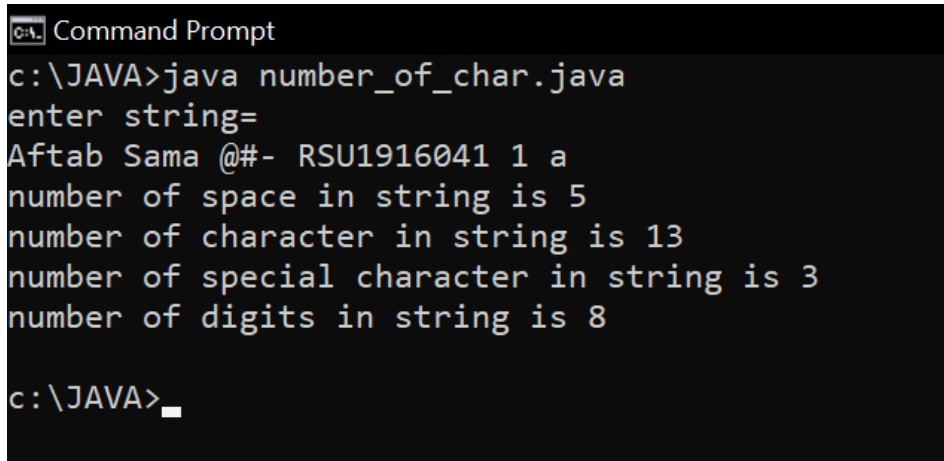
```
Command Prompt
c:\JAVA>java number_of_char.java
enter string=
Aftab Sama @#- RSU1916041 1 a
number of space in string is 5
number of character in string is 13
number of special character in string is 3
number of digits in string is 8

c:\JAVA>_
```

6)WAP to check palindrome of a string

import java.util.Scanner;

public class Main {

      public static void main(String[] args) {

          Scanner sc=new Scanner(System.in);

          String s1;

          int i=0,n;

          System.out.println("enter string= ");

          s1=sc.nextLine();

          n=s1.length();

          char[]a= new char[n];

          for(i=0;i<n;i++)

          {

              a[i]=s1.charAt(i);

          }
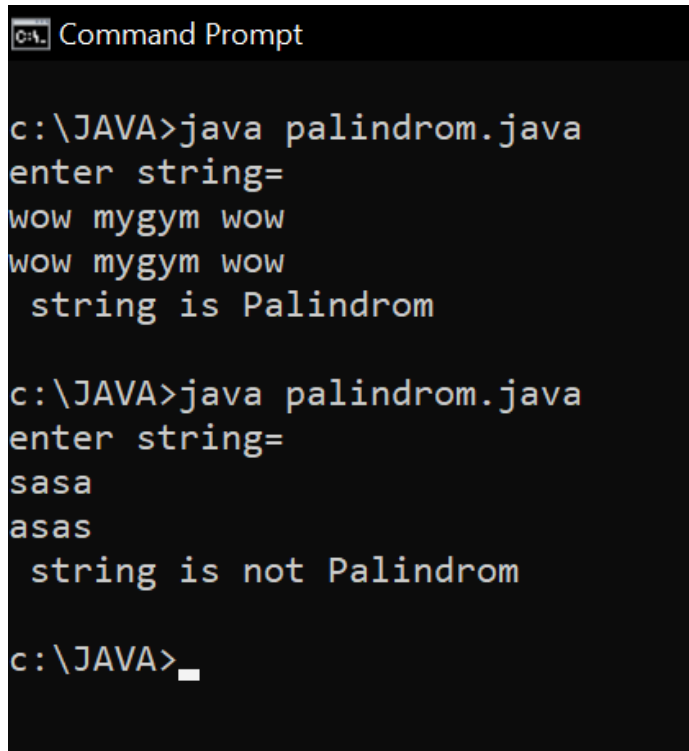
```java
for(int j=n-1;j>=0;j--)
{
        System.out.print(a[j]);
}
int k=0;
for(int c=0;c<n;c++){
if(a[n-1-c]!=s1.charAt(c)){   k++; };
}
System.out.println(" ");
if(k==0){ System.out.println(" string is Palindrom"); } else{ System.out.println(" string is not Palindrom"); }
    }
}
```

```
Command Prompt

c:\JAVA>java palindrom.java
enter string=
wow mygym wow
wow mygym wow
 string is Palindrom

c:\JAVA>java palindrom.java
enter string=
sasa
asas
 string is not Palindrom

c:\JAVA>_
```

PRACTICAL 3

1)Program to create and display unique 3 digits number using 1,2,3,4. Also count how many 3 digits no.s are there

```java
import java.util.*;
public class Main {
    public static void main(String[] args) {
        Scanner sc=new Scanner(System.in);
        int d[]=new int[4],i,k,k1=0,i1=0,j1=0,l=0,l1=0,j;

        System.out.println("enter d1=");
        d[0]=sc.nextInt();
        System.out.println("enter d2=");
        d[1]=sc.nextInt();
        System.out.println("enter d3=");
        d[2]=sc.nextInt();
        System.out.println("enter d4=");
        d[3]=sc.nextInt();
        for(i=0;i<2;i++){

            for(j=0;j<2;j++){
                j1=k1+1;
                for(k=0;k<6;   ){
```

```
            if(i1>3){  i1=0;}



            if(j1>3){  j1=0;}


    {
    System.out.print( d[k1]);


    }


        {
           System.out.print(  d[j1] );


    }



        if(i1==k1){  i1++;}
                                    if(i1==j1){  i1++;}
                                        if(i1>3){  i1=0;}    {
                System.out.print( d[i1] );



    }


     if(k%2!=0){ j1++; }
     i1++;
```

```java
            if(k==5){ k1++;  l++; }


        System.out.println(" ");

        k++;

        }

         }

        }

        System.out.println("total uniqeu number = 24");




    }

}
```
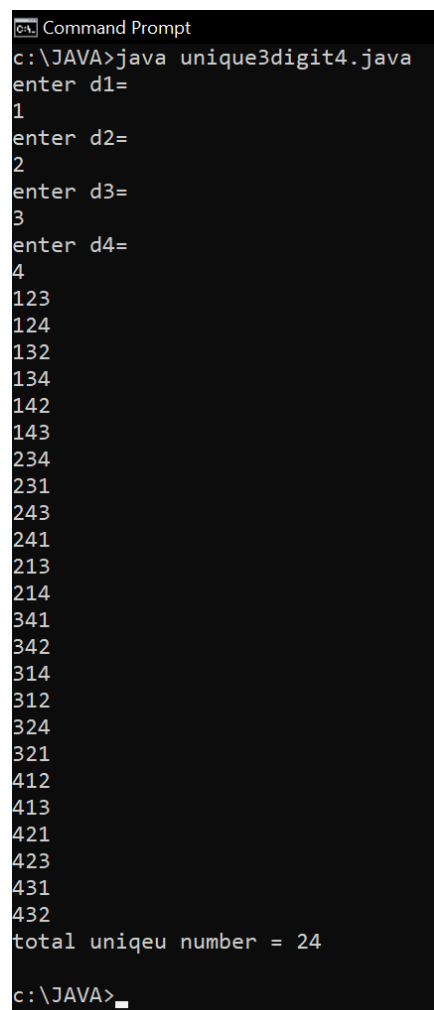
```
Command Prompt
c:\JAVA>java unique3digit4.java
enter d1=
1
enter d2=
2
enter d3=
3
enter d4=
4
123
124
132
134
142
143
234
231
243
241
213
214
341
342
314
312
324
321
412
413
421
423
431
432
total uniqeu number = 24

c:\JAVA>
```

2)WAP to print ASCII value of given char and check using function whether it is no., alphabet, space or special chars

```java
import java.util.*;

public class Main {
    public static void main(String[] args) {
        String ch;   int i,j,c=0,s=0,n=0,schar=0;
        Scanner sc=new Scanner(System.in);
        System.out.println("enter char=");
        ch=sc.nextLine();
        for(i=0;i<ch.length();i++){  j=ch.charAt(i);
        System.out.println("ASCII value of '"+ch.charAt(i)+"' is "+j);}
        for(i=0;i<ch.length();i++){
            if(Character.isDigit(ch.charAt(i))){ n++;  }
            if(Character.isAlphabetic(ch.charAt(i))){ c++;  }
            if(Character.isSpace(ch.charAt(i))){ s++;  }
            schar=ch.length()-n-c-s;
        }

        System.out.println("total number is "+n);
        System.out.println("total space is "+s);
        System.out.println("total special char is "+schar);
        System.out.println("total character is "+c);
    }
}
```

```
Command Prompt

c:\JAVA>java ascii_character.java
Note: ascii_character.java uses or overrides a deprecated API.
Note: Recompile with -Xlint:deprecation for details.
enter char=
A@1- a
ASCII value of 'A' is 65
ASCII value of '@' is 64
ASCII value of '1' is 49
ASCII value of '-' is 45
ASCII value of ' ' is 32
ASCII value of 'a' is 97
total number is 1
total space is 1
total special char is 2
total character is 2

c:\JAVA>
```

3)WAP to multi-dimensional array with second dimension of sizes 3,5,2,4 and iterate to point its value

import java.util.*;

public class Main {

      public static void main(String[] args) {

          Scanner sc=new Scanner(System.in);

          int [][]a=new int [4][];
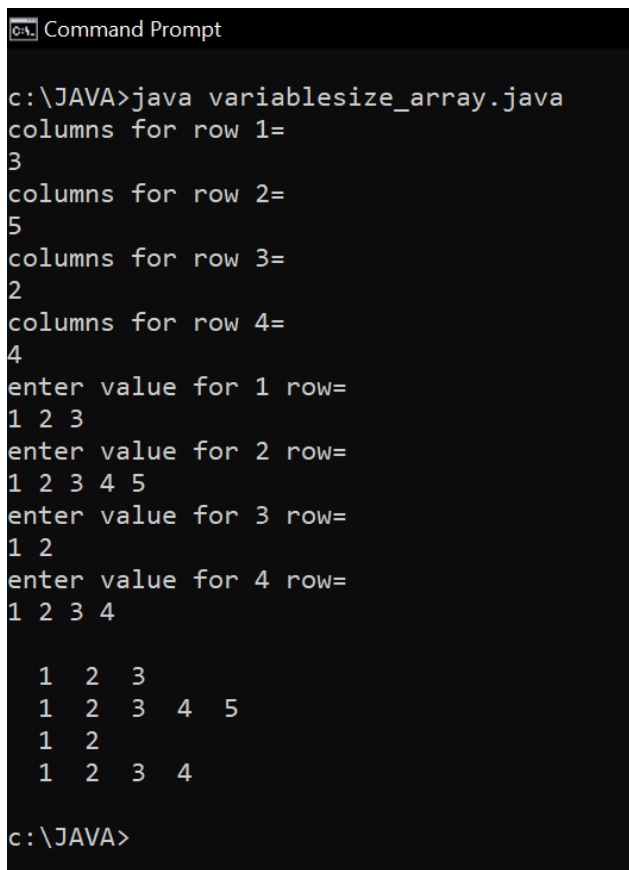
          int []n=new int [4]; int i,j,k;

          System.out.println("columns for row 1=");

```java
n[0]=sc.nextInt();
System.out.println("columns for row 2=");
n[1]=sc.nextInt();
System.out.println("columns for row 3=");
n[2]=sc.nextInt();
System.out.println("columns for row 4=");
n[3]=sc.nextInt();
a[0]= new int[n[0]];
        a[1]= new int[n[1]];
                a[2]= new int[n[2]];
                        a[3]= new int[n[3]];


System.out.println("enter value for 1 row=");
for(i=0;i<n[0];i++){
        a[0][i]=sc.nextInt();
}
System.out.println("enter value for 2 row=");
for(i=0;i<n[1];i++){
        a[1][i]=sc.nextInt();
}
System.out.println("enter value for 3 row=");
for(i=0;i<n[2];i++){
        a[2][i]=sc.nextInt();
}
System.out.println("enter value for 4 row=");
for(i=0;i<n[3];i++){
        a[3][i]=sc.nextInt();
```

```
              }
       System.out.println("  ");
       for(j=0;j<4;j++){
     for(k=0;k<n[j];k++){
       System.out.print("  "+a[j][k]);
     }
       System.out.println("   ");
               }


       }
}
```

```
Command Prompt

c:\JAVA>java variablesize_array.java
columns for row 1=
3
columns for row 2=
5
columns for row 3=
2
columns for row 4=
4
enter value for 1 row=
1 2 3
enter value for 2 row=
1 2 3 4 5
enter value for 3 row=
1 2
enter value for 4 row=
1 2 3 4

  1   2   3
  1   2   3   4   5
  1   2
  1   2   3   4

c:\JAVA>
```

4)WAP to sort an array using minimum value comparison

```java
import java.util.*;
public class Main {
        public static void main(String[] args) {
                int i,j,n,x;
                Scanner sc=new Scanner(System.in);
                System.out.println("array limit=");
                n=sc.nextInt();
                int a[]=new int[n];
                for(i=0;i<n;i++){
                        System.out.println("a["+i+"]=");
                        a[i]=sc.nextInt();
                }
                System.out.println("sorted array in accending order");

                for(i=0;i<n;i++){  x=a[i];
                        for(j=i;j<n;j++){
                                if(a[j]<x){  x=a[j];  a[j]=a[i];   a[i]=x;}


                        }


                }
                for(i=0;i<n;i++){
                        System.out.println(a[i]);
```
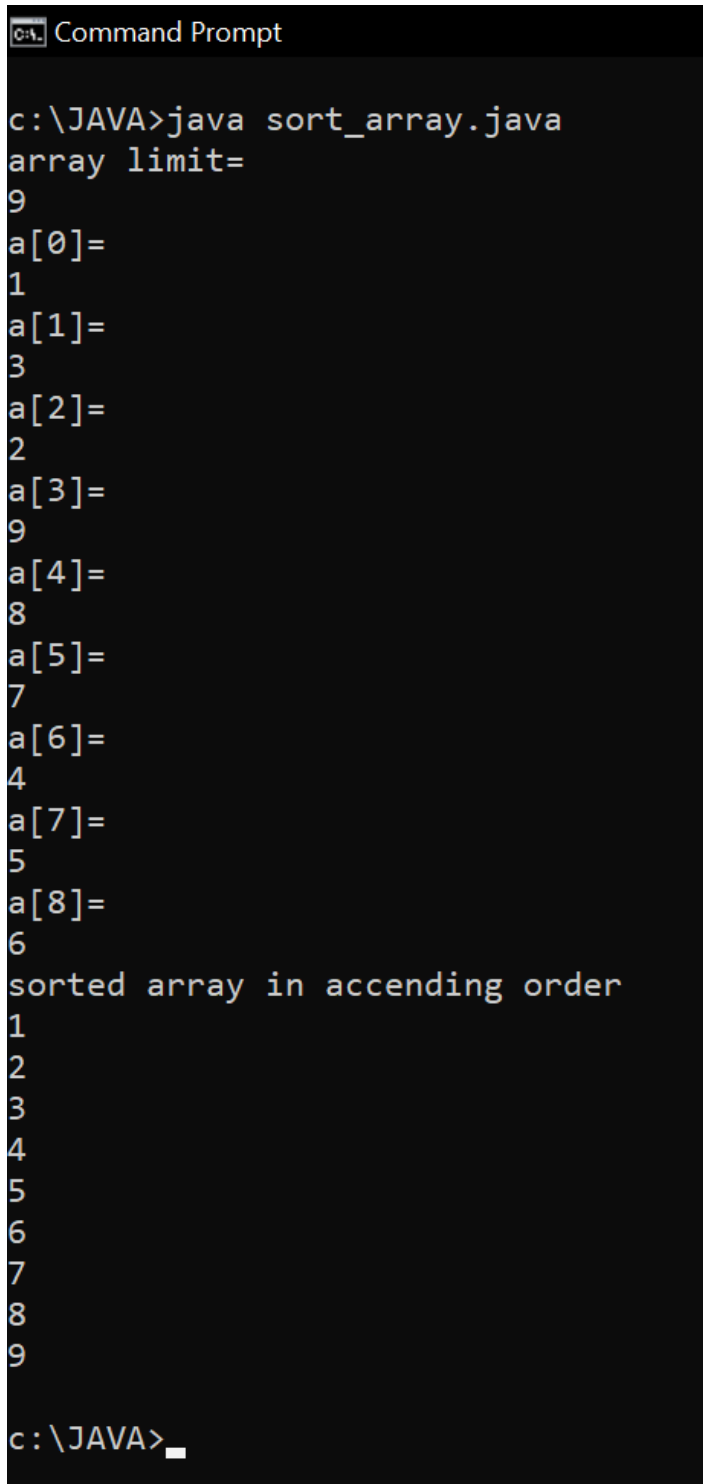
```
            }

        }

}
```

```
Command Prompt

c:\JAVA>java sort_array.java
array limit=
9
a[0]=
1
a[1]=
3
a[2]=
2
a[3]=
9
a[4]=
8
a[5]=
7
a[6]=
4
a[7]=
5
a[8]=
6
sorted array in accending order
1
2
3
4
5
6
7
8
9

c:\JAVA>
```

5)WAP to implement StringBuffer to increase its capacity and modify it until user insists.

```
import java.util.*;
import java.io.*;
public class Main {
        public static void main(String[] args) {
                Scanner sc=new Scanner(System.in);
                int i,j,k,n,p;
                String x;
                String v;
                StringBuffer s =new StringBuffer(5);


                for(i=0; i<3; )
                {
                System.out.println(" enter 1-add string ,2-replace , 3-delete 4-insert 0-exit ");
                n=sc.nextInt();
                if(n==1){
                System.out.println("enter string=");
                x=sc.nextLine();
                        x=sc.nextLine();
                s.append(x);
```
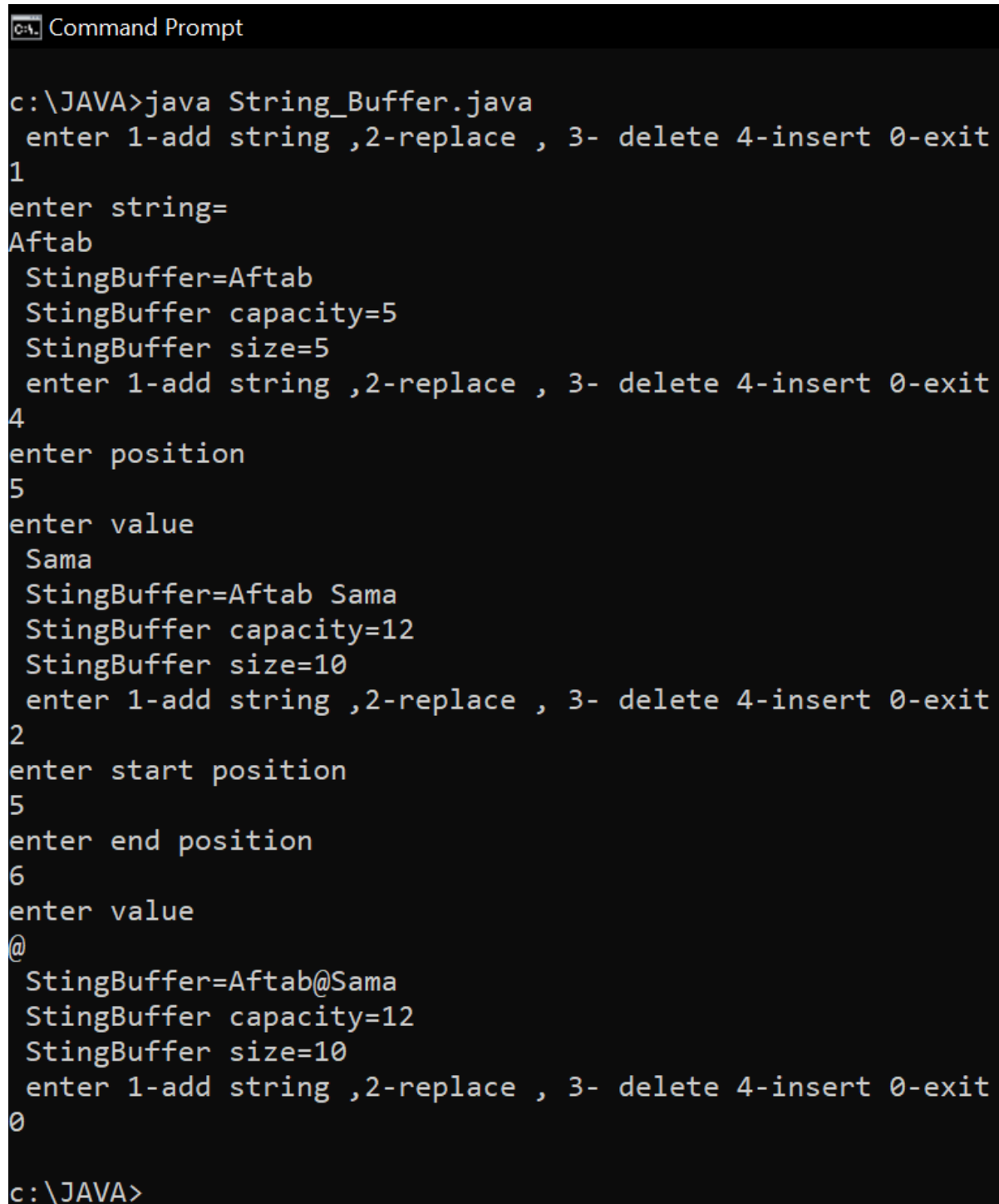
```
                System.out.println(" StingBuffer="+s);
                System.out.println(" StingBuffer
capacity="+s.capacity());
                System.out.println(" StingBuffer size="+s.length());



            i=1;
        }
        if(n==4){
                System.out.println("enter position");
                p=sc.nextInt();
                System.out.println("enter value");
                v=sc.nextLine();
                v=sc.nextLine();
                s.insert(p,v);


                System.out.println(" StingBuffer="+s);
                    System.out.println(" StingBuffer
capacity="+s.capacity());
                System.out.println(" StingBuffer size="+s.length());
             i=1;


        }
        if(n==3){
        System.out.println("enter start position");
                j=sc.nextInt();
        System.out.println("enter end position");
```

```
                        k=sc.nextInt();
                        s.delete(j,k);
                        System.out.println(" StingBuffer="+s);
                        System.out.println(" StingBuffer
capacity="+s.capacity());
                System.out.println(" StingBuffer size="+s.length());
                   i=1;
                }
                if(n==2)
                {
                System.out.println("enter start position");
                        j=sc.nextInt();
        System.out.println("enter end position");
                        k=sc.nextInt();
                        System.out.println("enter value");
                        v=sc.nextLine();
                        v=sc.nextLine();
                        s.replace(j,k,v);
                        System.out.println(" StingBuffer="+s);
                        System.out.println(" StingBuffer
capacity="+s.capacity());
                System.out.println(" StingBuffer size="+s.length());
                   i=1;
                }

                if(n==0){  i=4;}
        }
```

```
    }

}
```

```
Command Prompt

c:\JAVA>java String_Buffer.java
 enter 1-add string ,2-replace , 3- delete 4-insert 0-exit
1
enter string=
Aftab
 StingBuffer=Aftab
 StingBuffer capacity=5
 StingBuffer size=5
 enter 1-add string ,2-replace , 3- delete 4-insert 0-exit
4
enter position
5
enter value
 Sama
 StingBuffer=Aftab Sama
 StingBuffer capacity=12
 StingBuffer size=10
 enter 1-add string ,2-replace , 3- delete 4-insert 0-exit
2
enter start position
5
enter end position
6
enter value
@
 StingBuffer=Aftab@Sama
 StingBuffer capacity=12
 StingBuffer size=10
 enter 1-add string ,2-replace , 3- delete 4-insert 0-exit
0

c:\JAVA>
```

6)WAP to search a value in m*n matrix

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

        int i,m,n,j,k,x=0,r,v;
        Scanner sc=new Scanner(System.in);
        System.out.println("row=");
        m=sc.nextInt();
            System.out.println("column=");
        n=sc.nextInt();
        int a[][]=new int [m][n];
        for(i=0;i<m;i++){
            for(j=0;j<n;j++){
                System.out.print("a["+i+"]["+j+"]=");
                a[i][j]=sc.nextInt();

            }

        }
            for(i=0;i<m;i++){
            for(j=0;j<n;j++){
                System.out.print("   "+a[i][j]);

            }
```

```
                    System.out.println(" ");

        }

        for(r=0;r<3;){

        System.out.println(" ");

        System.out.println("enter 1-search 0-exit=");

        v=sc.nextInt();

    if(v==1){    System.out.println("search=");

        k=sc.nextInt();

                for(i=0;i<m;i++){

                for(j=0;j<n;j++){

                        if(a[i][j]==k){    System.out.print("match found " +

                                        "a["+i+"]["+j+"]="+ a[i][j] );

                                x=1;            }

                }

        }

        if(x!=1){ System.out.println("no match found");  }

    }else if(v==0){  r=5;}else{

    System.out.println("invalid input"); }

        }

    }
}
```

```
Command Prompt

c:\JAVA>java search_array.java
row=
3
column=
3
a[0][0]=1
a[0][1]=2
a[0][2]=3
a[1][0]=4
a[1][1]=5
a[1][2]=6
a[2][0]=7
a[2][1]=8
a[2][2]=9
    1    2    3
    4    5    6
    7    8    9

enter 1-search 0-exit=
1
search=
6
match found a[1][2]=6
enter 1-search 0-exit=
0

c:\JAVA>_
```
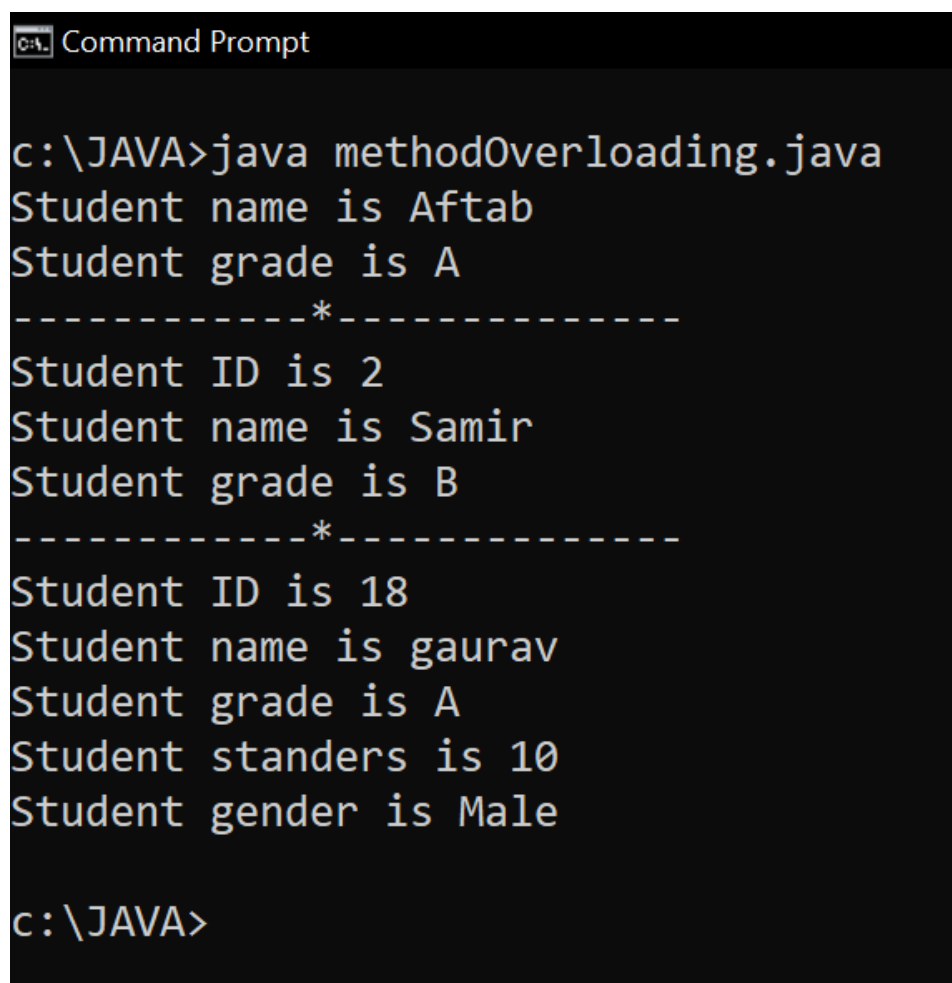
PRACTICAL 4

1)WAP to implement constructor, method overloading for class student for at least 5 attributes and 3-5 methods

```
public class student
 {
 public static void student(String studentName,char grade)
  {
   System.out.println("Student name is "+studentName);
   System.out.println("Student grade is "+grade);
  }
 public static void student(int id,String studentName,char grade)
  {
   System.out.println("Student ID is "+id);
   System.out.println("Student name is "+studentName);
   System.out.println("Student grade is "+grade);
  }
 public static void student(int id,String studentName,char grade,int standerd,String gender)
  {
   System.out.println("Student ID is "+id);
   System.out.println("Student name is "+studentName);
   System.out.println("Student grade is "+grade);
   System.out.println("Student standers is "+standerd);
   System.out.println("Student gender is "+gender);
  }
```

```java
public static void main(String[]args)
{
  //student Obj=new student();
  student("Aftab",'A');
  System.out.println("------------*-------------");
  student(2, "Samir", 'B');
  System.out.println("------------*-------------");
  student(18, "gaurav", 'A',10,"Male");


}
}
```

```
Command Prompt

c:\JAVA>java methodOverloading.java
Student name is Aftab
Student grade is A
------------*-------------
Student ID is 2
Student name is Samir
Student grade is B
------------*-------------
Student ID is 18
Student name is gaurav
Student grade is A
Student standers is 10
Student gender is Male

c:\JAVA>
```

2)show recursion in java for Fibonacci sequence

```java
import java.util.*;
public class recursivFibo{
public static int a=1,s=0;
  public static void fibo(int n){
      if (s==0) {
              System.out.print(" 0, 1");
      }
    System.out.print(", "+(a+s));
     if(n>3){
       a=s+a;  s=a-s;
       n--;
       fibo(n);
     }

  }
      public static void main(String args[]) {
              int n;
              Scanner sc=new Scanner(System.in);
              System.out.println(" number of fibonaci=");
              n=sc.nextInt();
              fibo(n);
      }
}
```
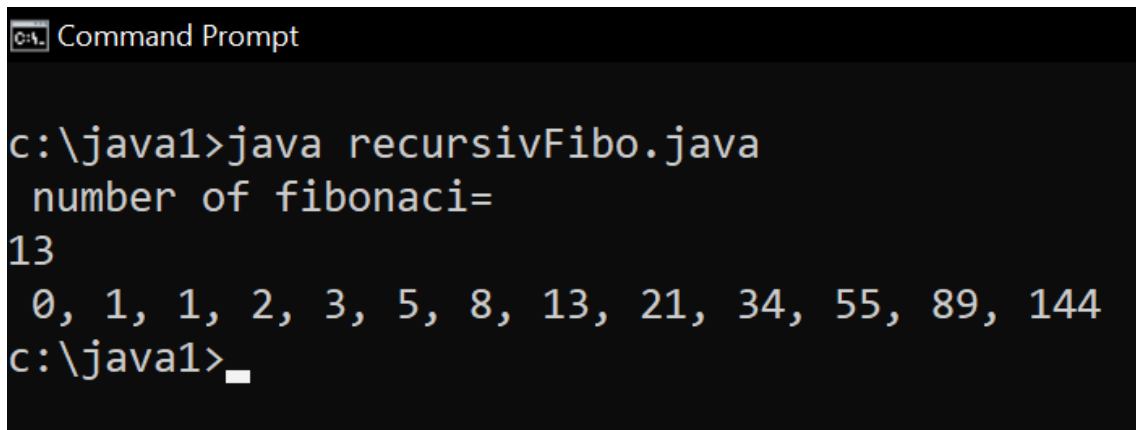
```
Command Prompt

c:\java1>java recursivFibo.java
 number of fibonaci=
13
 0, 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144
c:\java1>_
```

3)create a class to take a statement as i/p and count (i)vowels of each type in it (II) words that start with capital letter. Continue till user types "quit"

import java.util.*;

class p3{

    public static void main(String[] args) {

String s;

Scanner sc=new Scanner(System.in);

int i=0,x,n=0,a=0,j,r;

 /*   count vowels and words that start with capital letters*/

       for (x=0;x<3 ;) {

       System.out.println("Enetr string=");

       s=sc.nextLine();

       r=s.length();

   if (s.length()>4&&s.charAt(r-4)=='q'&&s.charAt(r-3)=='u'&&s.charAt(r-2)=='i'&&s.charAt(r-1)=='t')

```
        { x=7;


     }
     for (i=0;i<s.length() ;i++ ) {
          if (s.charAt(i)=='a') { a++;


          }if (s.charAt(i)=='e') { a++;


          }if (s.charAt(i)=='i') { a++;


          }if (s.charAt(i)=='o') { a++;


          }if (s.charAt(i)=='u') { a++;


          }if (s.charAt(i)=='A') { a++;


          }if (s.charAt(i)=='E') { a++;


          }if (s.charAt(i)=='I') { a++;


          }if (s.charAt(i)=='O') { a++;


          }if (s.charAt(i)=='U') { a++;


          }
```

```java
        }if (s.charAt(0)>='A'&&s.charAt(0)<='Z') { n++;


        }for (j=0;j<s.length()-1 ;j++ ) {
          if (s.charAt(j)==' '&& s.charAt(j+1)>='A'&&s.charAt(j+1)<='Z')
{ n++;


        }


        }
    System.out.println("number of vowel="+a);
     System.out.println("number of words start with capital letter="+n);
     a=0; n=0;


    }
        }
}
```
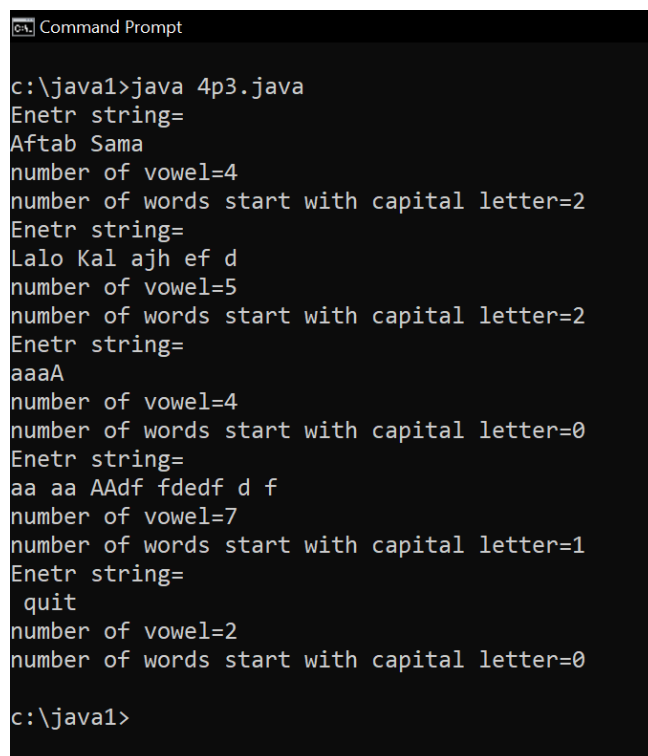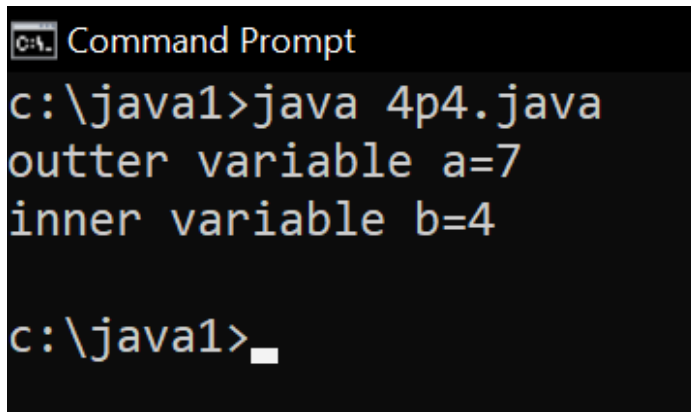
```
Command Prompt

c:\java1>java 4p3.java
Enetr string=
Aftab Sama
number of vowel=4
number of words start with capital letter=2
Enetr string=
Lalo Kal ajh ef d
number of vowel=5
number of words start with capital letter=2
Enetr string=
aaaA
number of vowel=4
number of words start with capital letter=0
Enetr string=
aa aa AAdf fdedf d f
number of vowel=7
number of words start with capital letter=1
Enetr string=
 quit
number of vowel=2
number of words start with capital letter=0

c:\java1>
```

4)create an outer class employee and inner class (non-static). Call the method of inner class to access details within both.

```java
class main{
        public static void main(String[] args) {
                /*inner class to access variable with both*/
        //        Scanner sc=new Scanner(System.in);
        outter out=new outter();
        outter.inner inr=out.new inner();


        System.out.println("outter variable a="+inr.o());



        System.out.println("inner variable b="+inr.d());


        }
}
public class outter{
   int a=7;


        public class inner{
     int b=4;
   public int d(){
    return b;
    }  public int o() {
```

```
    return a;

  }

      }

}
```


5)WAP to implement Base Class (abstract) and child class Cat, Dog, Lion, Tiger to implement methods declared in base class. Also use constructors in base and derived classes

```
class p5{

        public static void main(String[] args) {

                base b=new cat();

                base b1=new dog();

                base b2=new lion();

                base b3=new tiger();


        b.draw();

        b1.draw();
```

```java
        b2.draw();
        b3.draw();


    }
}
public abstract class base{
    base(){


    }
    public abstract void draw();
}
public class cat extends base{
    cat(){


    }
 public void draw(){
     System.out.println("This is cat class");


 }
}
public class dog extends base{
    dog(){


    }
 public void draw(){
     System.out.println("This is dog class");
 }
```
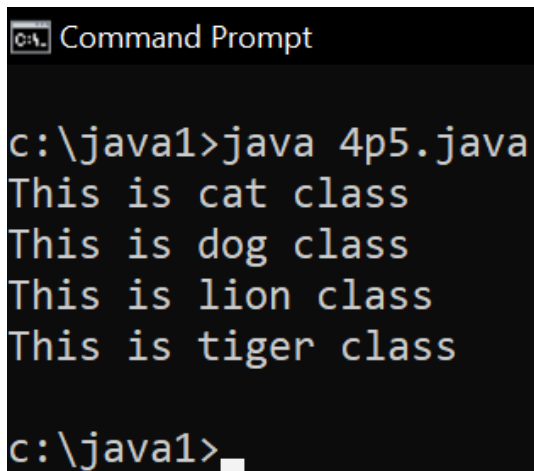
```
}

public class lion extends base{
lion(){
    }
 public void draw(){
      System.out.println("This is lion class");
        }
}


public class tiger extends base{
tiger(){
    }
   public    void draw(){
      System.out.println("This is tiger class");
        }

}
```
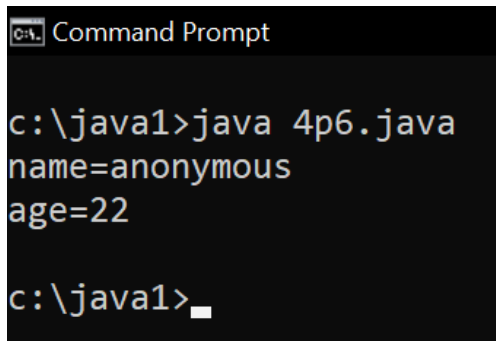
```
c:\java1>java 4p5.java
This is cat class
This is dog class
This is lion class
This is tiger class

c:\java1>
```

6)WAP to implement Anonymous Inner class of employee and print its details.

```java
// anonymous inner class
class p6
{
    public static void main(String[] args)
    {
        an obj=new an()
        {
            public void getan()
            {
                System.out.println("name="+s);
                System.out.println("age="+n);

            }

        };
         obj.getan();


    }
}
public abstract class an
{
   int n=22;
```

String s="anonymous";

public abstract void getan();

}

PRACTICAL 5

1. WAP to implement Multilevel and hierarchical inheritance.

```java
//  multilevel inheritance and heirarchical inheritance
import java.util.*;
class main{
        public static void main(String[] args) {
                String n1,n2;
                Scanner sc=new Scanner(System.in);
    son s=new son();
    daughter d=new daughter();
```

```
        System.out.println("This is son : Enter name = ");

          n1=sc.nextLine();

        System.out.println("This is Daughter : Enter name = ");

          n2=sc.nextLine();

           son s1=new son(n1);

        daughter d1=new daughter(n2);



            }

    }

public class gfather{

        public void gf(){

                System.out.println("This is Grand Father class");

            }



    }

public class father extends gfather{

        public void f(){

                System.out.println("This is Father class extends grand father");

            }

    }

 public class son extends father{



        son(){

                gf();

        f();
```

```java
        System.out.println("This is son class extends father");

    }

    son(String name){

        System.out.println("This is son : My name is "+name);

    }

}
public class daughter extends father{

    daughter(){
        System.out.println("This is Daughter class extends father");
    }
    daughter(String name){

        System.out.println("This is Daughter : My name is "+name);

    }

}
```
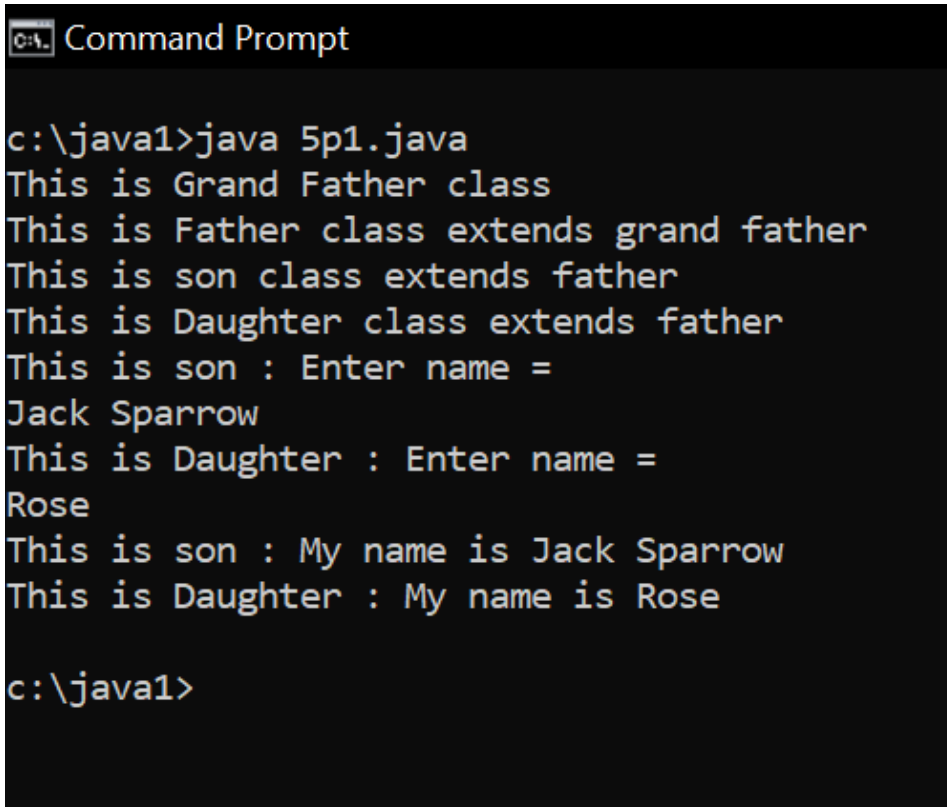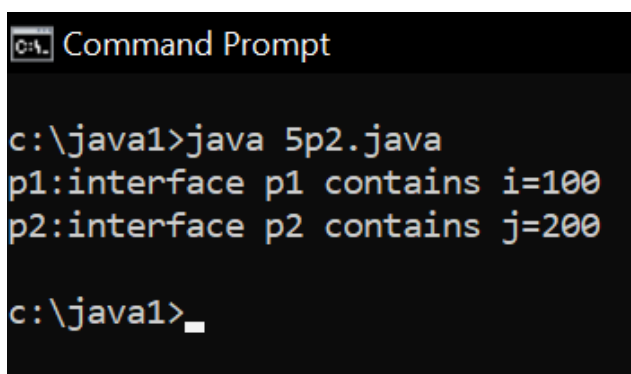
```
Command Prompt

c:\java1>java 5p1.java
This is Grand Father class
This is Father class extends grand father
This is son class extends father
This is Daughter class extends father
This is son : Enter name =
Jack Sparrow
This is Daughter : Enter name =
Rose
This is son : My name is Jack Sparrow
This is Daughter : My name is Rose

c:\java1>
```

2. Write a program that illustrates interface inheritance. Interface P12 inherits from both P1 and P2. Each interface declares one constant and one method. The class Q implements P12. Instantiate Q and invoke each of its methods. Each method displays one of the constants.

```java
public class q implements p12{
        public void d1(){

                System.out.println("p1:interface p1 contains i="+i);

            }
   public void d2(){

                System.out.println("p2:interface p2 contains j="+j);
```
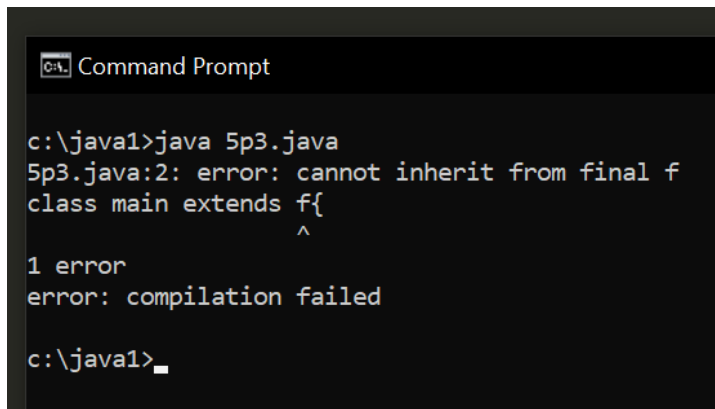
```
        }
    public static void main(String[] args) {
            q p=new q();


    p.d1();
    p.d2();
     }
}
public interface p1{
        int i=100;
          void d1();
}
public interface p2{
        int j=200;
          void d2();
}
public interface p12 extends p1,p2{


}
```

```
Command Prompt

c:\java1>java 5p2.java
p1:interface p1 contains i=100
p2:interface p2 contains j=200

c:\java1>_
```

3. Write a program in Java to demonstrate use of final class.

final class f{ }

class main extends f{

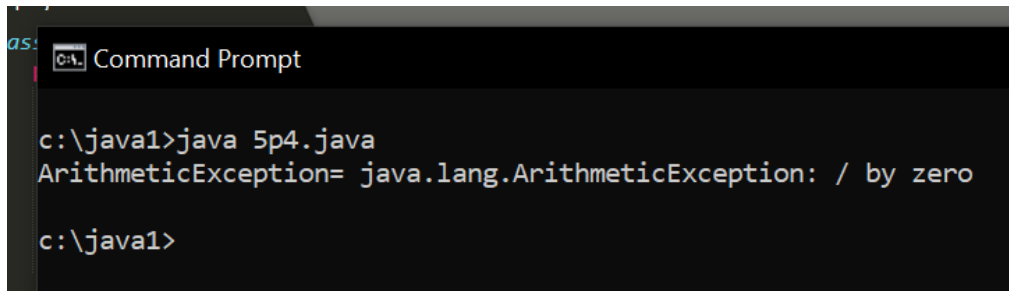   public static void main(String[] args) {

      }

}

```
Command Prompt

c:\java1>java 5p3.java
5p3.java:2: error: cannot inherit from final f
class main extends f{
                   ^
1 error
error: compilation failed

c:\java1>
```

4. WAP to demonstrate DivideByZero Exception in Java.

class p4{

      public static void main(String[] args) {

          int a,b,c;

          a=55;

          b=0;

    try { c=a/b; }

```
catch (ArithmeticException e){

 System.out.println("ArithmeticException= "+e);

}


}

}
```
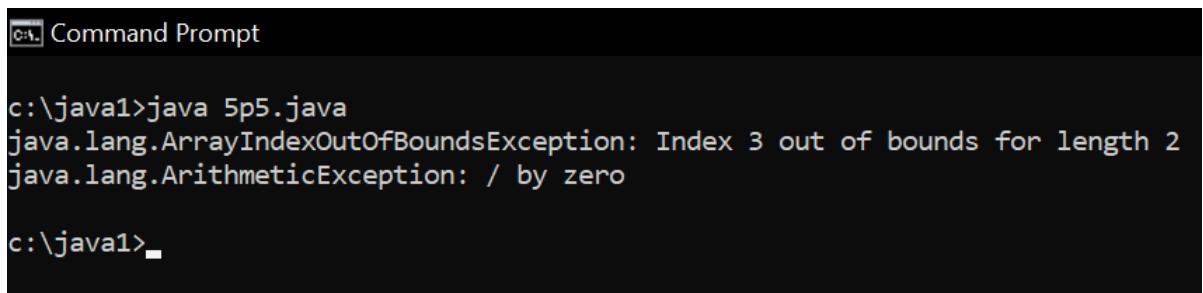


```
c:\java1>java 5p4.java
ArithmeticException= java.lang.ArithmeticException: / by zero

c:\java1>
```

5. WAP to show nesting of try blocks using ArithmeticException and ArrayIndexOutOfBoundException.

```
class p5{
    public static void main(String[] args) {
        int []a=new int[2];
        a[0]=1;
        a[1]=2;
    try{
        try{
            a[3]=4;
        }catch(ArrayIndexOutOfBoundsException e2){
            System.out.println(e2);
        }
        a[2]=3/0;
        a[1]=1/0;
```

```
            }
                catch(ArithmeticException e){
        System.out.println(e);
                }
                catch(Exception e){
                System.out.println(e);
        }



            }
}
```
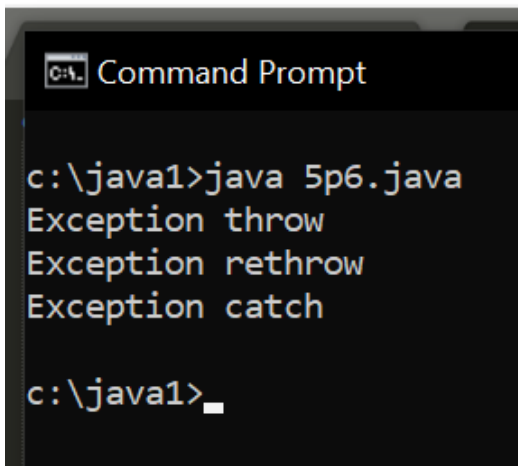
```
Command Prompt

c:\java1>java 5p5.java
java.lang.ArrayIndexOutOfBoundsException: Index 3 out of bounds for length 2
java.lang.ArithmeticException: / by zero

c:\java1>
```

6. WAP to show execution of throw and rethrow.

```
class p6{
        public static void t() throws Exception{
                try{
                        System.out.println("Exception throw");
                        throw new Exception("Exception throw");
```

```java
        }catch(Exception e){

                System.out.println("Exception rethrow");

                throw e;

        }

    }

    public static void main(String[] args) {


        try{

            t();

        }catch(Exception e){

                System.out.println("Exception catch ");

        }

    }

}
```
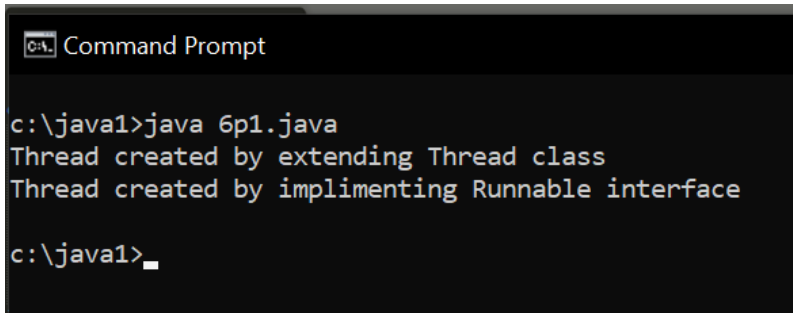
```
c:\java1>java 5p6.java
Exception throw
Exception rethrow
Exception catch

c:\java1>
```

Practical 6:

1. Write a Java Program to create threads using Thread class and Runnable Interface.

```java
class p61{
        public static void main(String[] args) {
                t1 t1=new t1();
                t2 t2=new t2();
        Thread t=new Thread(t2);
        t1.start();
        t.start();
        }
}
class t1 extends Thread{
        public void run(){
        System.out.println("Thread created by extending Thread class");
        }
}
class t2 implements Runnable{
        public void run(){
        System.out.println("Thread created by implimenting Runnable interface");
        }
}
```

```
Command Prompt

c:\java1>java 6p1.java
Thread created by extending Thread class
Thread created by implimenting Runnable interface

c:\java1>_
```

2. Create 3 threads in java and call run to print to execute a loop. Start all 3 together.

```
class p62{
        public static void main(String[] args) {
   t t =new t();
   Thread t1=new Thread(t);
   Thread t2=new Thread(t);
   Thread t3=new Thread(t);
    t1.start();
    t2.start();
    t3.start();


        }
}

class t implements Runnable{
        public void run(){
    for (int i=1;i<=5 ;i++ ) {
```
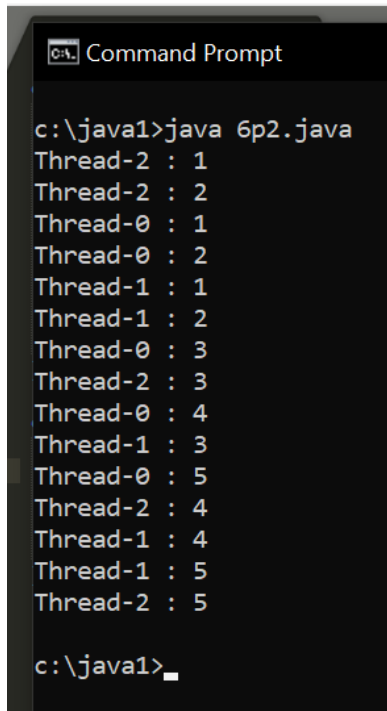
System.out.println(Thread.currentThread().getName()+" : "+i);

     }

  }

}

```
Command Prompt

c:\java1>java 6p2.java
Thread-2 : 1
Thread-2 : 2
Thread-0 : 1
Thread-0 : 2
Thread-1 : 1
Thread-1 : 2
Thread-0 : 3
Thread-2 : 3
Thread-0 : 4
Thread-1 : 3
Thread-0 : 5
Thread-2 : 4
Thread-1 : 4
Thread-1 : 5
Thread-2 : 5

c:\java1>_
```

3. Show thread life cycle in Java using program. Refer functions – start,run,sleep,notify,notifyAll,wait,stop

```
class p62{
        public static void main(String[] args) {
   t t1=new t();
   t t2=new t();
   t t3=new t();
   t1.setName("Thread-A");
```

```java
t2.setName("Thread-B");
t3.setName("Thread-C");
    System.out.println("Thread-A state-"+ t1.getState());
    System.out.println("Thread-B state-"+t2.getState());
    System.out.println("Thread-C state-"+t3.getState());
t1.start();
t2.start();
t3.start();
 t1.stop();
    System.out.println(t1.getName()+" ID "+ t1.getState());
    t1.resume();


  try{ t3.wait(); }catch(Exception e){ }
    System.out.println(t1.getName()+" ID "+ t1.getId());
    System.out.println(t2.getName()+" ID "+ t2.getId());
    System.out.println(t3.getName()+" ID "+ t3.getId());
System.out.println("currentThread is "+Thread.currentThread());
      System.out.println("Thread-A is Alive "+ t1.isAlive());



    System.out.println("Thread-A state-"+ t1.getState());
  System.out.println("Thread-B state-"+t2.getState());
  System.out.println("Thread-C state-"+t3.getState());




    }
```

```
}

class t extends Thread{


    public void run(){
  System.out.println(Thread.currentThread().getName()+" state "+ getState());
    System.out.println("creating  "+Thread.currentThread().getName());
     System.out.println(Thread.currentThread().getName()+" is running");
    System.out.println(Thread.currentThread().getName()+" in sleep");
   try{ sleep(100); }catch(Exception e){  }
     System.out.println(Thread.currentThread().getName()+" state "+
getState());
    System.out.println(Thread.currentThread().getName()+" is wake up");
   System.out.println(Thread.currentThread().getName()+" state "+ getState());



    }
}
```

```
Command Prompt

c:\java1>java 6p3.java
6p3.java:17: warning: [removal] resume() in Thread has been deprecated and marked for removal
        t1.resume();
         ^
Note: 6p3.java uses or overrides a deprecated API.
Note: Recompile with -Xlint:deprecation for details.
1 warning
Thread-A state-NEW
Thread-B state-NEW
Thread-C state-NEW
Thread-A ID RUNNABLE
Thread-C state RUNNABLE
Thread-B state RUNNABLE
creating  Thread-B
creating  Thread-C
Thread-C is running
Thread-B is running
Thread-C in sleep
Thread-B in sleep
Thread-A ID 15
Thread-B ID 16
Thread-C ID 17
currentThread is Thread[main,5,main]
Thread-A is Alive false
Thread-A state-TERMINATED
Thread-B state-TIMED_WAITING
Thread-C state-TIMED_WAITING
Thread-B state RUNNABLE
Thread-C state RUNNABLE
Thread-B is wake up
Thread-C is wake up
Thread-B state RUNNABLE
Thread-C state RUNNABLE

c:\java1>
```
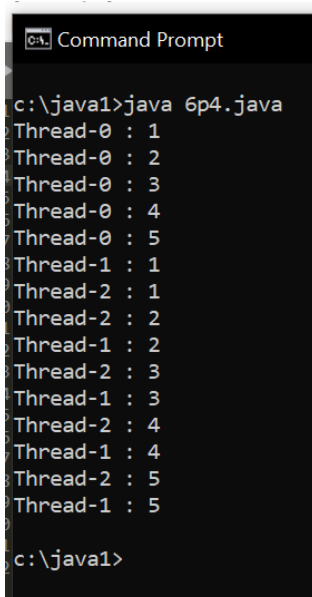
4. WAP to run a thread using Join method.

class p64{

     public static void main(String[] args) {

          t t1=new t();

          t t2=new t();

          t t3=new t();

```java
        t1.start();

        try{ t1.join();

            }catch(Exception e){ }

        t2.start();

        t3.start();

         }

}
class t extends Thread{

        public void run(){

                for (int i=1;i<6 ;i++ ) {


                System.out.println(Thread.currentThread().getName()+" : "+i);

                try{ sleep(100);

            }catch(Exception e){ }

                }

    }
}
```

```
Command Prompt

c:\java1>java 6p4.java
Thread-0 : 1
Thread-0 : 2
Thread-0 : 3
Thread-0 : 4
Thread-0 : 5
Thread-1 : 1
Thread-2 : 1
Thread-2 : 2
Thread-1 : 2
Thread-2 : 3
Thread-1 : 3
Thread-2 : 4
Thread-1 : 4
Thread-2 : 5
Thread-1 : 5

c:\java1>
```

5. WAP to show use of synchronized method. Create a class with synchronized method. Call it in 3 other thread classes. Start them together.

```java
class p65{
    public static void main(String[] args) {
        table t=new table();
        t1 t1 =new t1(t);
        t2 t2 =new t2(t);
        t3 t3 =new t3(t);


        t1.start();
        t2.start();
        t3.start();
    }
}
class table{
    synchronized void ptable(int n){
        System.out.println("synchronized methode");
        for (int i=1;i<11 ;i++ ) {
            System.out.println(n*i);
            try{
                Thread.sleep(100);
            }
            catch(Exception e){}
```
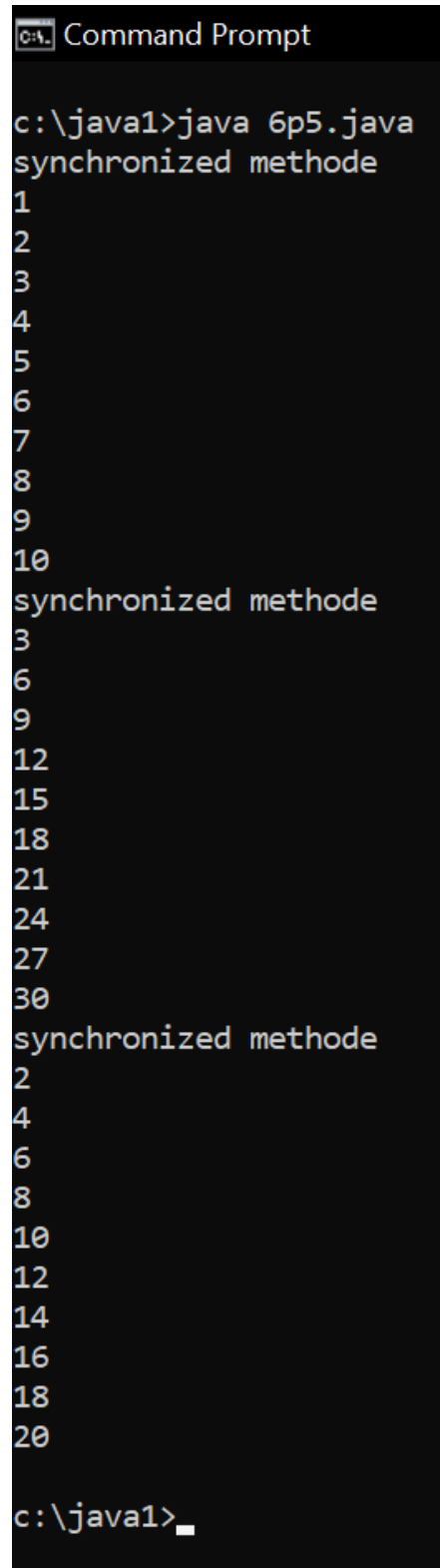
```java
                }
        }
}
class t1 extends Thread{
        table t;
        t1(table t){
                this.t=t;
        }
        public void run(){
                t.ptable(1);
        }
}
class t2 extends Thread{
        table t;
        t2(table t){
                this.t=t;
        }
        public void run(){
                t.ptable(2);
        }
}
class t3 extends Thread{
        table t;
        t3(table t){
                this.t=t;
        }
        public void run(){
```

```
        t.ptable(3);

    }

}
```

```
Command Prompt

c:\java1>java 6p5.java
synchronized methode
1
2
3
4
5
6
7
8
9
10
synchronized methode
3
6
9
12
15
18
21
24
27
30
synchronized methode
2
4
6
8
10
12
14
16
18
20

c:\java1>
```

6. Show the use of synchronized block.

```
class p66{
        public static void main(String[] args) {
                table t=new table();
                t1 t1 =new t1(t);
                t2 t2 =new t2(t);
                t3 t3 =new t3(t);


           t1.start();
                t2.start();
                t3.start();
        }
}
class table{
        void ptable(int n){
                synchronized(this){
                        System.out.println("synchronized block");
                for (int i=1;i<11 ;i++ ) {
                        System.out.println(n*i);
                        try{
                                Thread.sleep(100);
                        }
                        catch(Exception e){}


        }
```
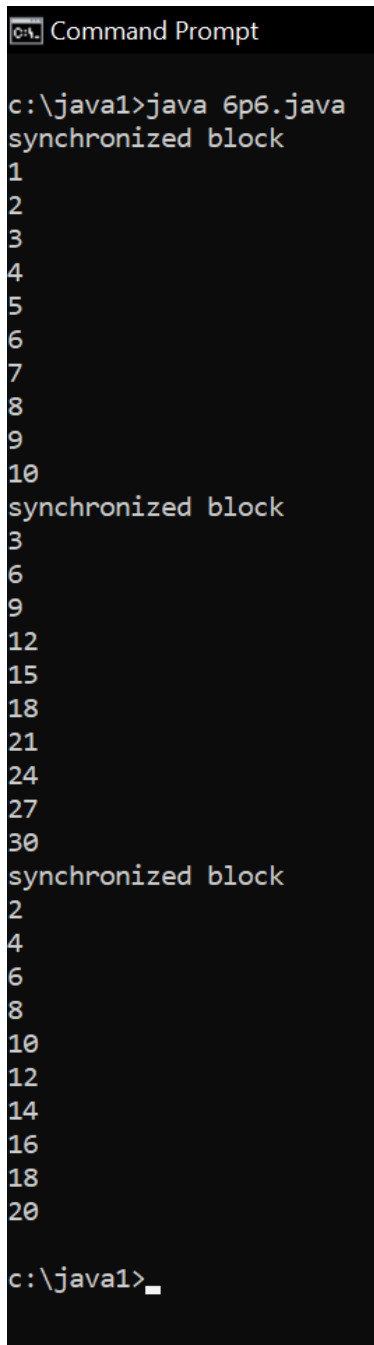
```java
        }
        }
}
class t1 extends Thread{
        table t;
        t1(table t){
                this.t=t;
        }
        public void run(){


                t.ptable(1);
        }
}
class t2 extends Thread{
        table t;
        t2(table t){
                this.t=t;
        }
        public void run(){
                t.ptable(2);
        }
}
class t3 extends Thread{
        table t;
        t3(table t){
                this.t=t;
        }
```

```java
    public void run(){
        t.ptable(3);
    }
}
```

```
Command Prompt

c:\java1>java 6p6.java
synchronized block
1
2
3
4
5
6
7
8
9
10
synchronized block
3
6
9
12
15
18
21
24
27
30
synchronized block
2
4
6
8
10
12
14
16
18
20

c:\java1>_
```

7. WAP to show deadlock condition between 3 threads in Java. Then release resource / end one of them to get the normal state

```java
//Deadlock condition
class p67{
    public static Object Lock1=new Object();
    public static Object Lock2=new Object();
    public static Object Lock3=new Object();
        public static void main(String[] args) {
    t1 t1=new t1();
        t2 t2=new t2();
        t3 t3=new t3();
    System.out.println(" Deadlock condition ");
        t1.start();
        t2.start();
        t3.start();
    }

private static class t1 extends Thread{



        public void run(){



            synchronized (Lock1){
```

```java
                System.out.println(Thread.currentThread().getName()+" is holding
s1");


        try{sleep(200);}catch(Exception e){}

                System.out.println(Thread.currentThread().getName()+" is waiting
for s2");


         synchronized (Lock2){

                System.out.println(Thread.currentThread().getName()+" is holding
s1 and s2 Process complete");

            }

          }

        }

}
private static class t2 extends Thread{


      public void run(){



        synchronized (Lock2) {

            System.out.println(Thread.currentThread().getName()+" is holding
s2");


        try{sleep(20);}catch(Exception e){}

            System.out.println(Thread.currentThread().getName()+" is waiting
for s3");


         synchronized (Lock3){
```

```java
            System.out.println(Thread.currentThread().getName()+" is holding
s3 and s2 Process complete");
        }
      }
    }
}
private static class t3 extends Thread{


    public void run(){



        synchronized (Lock3) {
            System.out.println(Thread.currentThread().getName()+" is holding
s3");



            try{sleep(20);}catch(Exception e){}
            System.out.println(Thread.currentThread().getName()+" is waiting
for s1");



            synchronized (Lock1){
                System.out.println(Thread.currentThread().getName()+" is holding
s1 and s3 Process complete");
            }
        }
    }
}
}
```

//End deadlock

```java
class p67{
    public static Object Lock1=new Object();
    public static Object Lock2=new Object();
    public static Object Lock3=new Object();
        public static void main(String[] args) {
      t1 t1=new t1();
          t2 t2=new t2();
          t3 t3=new t3();
      System.out.println("\n\n Deadlock end by terminating Thread-0 ");
          t1.start();
          t2.start();
          t3.start();
    t1.stop();


        }

private static class t1 extends Thread{


        public void run(){



            synchronized (Lock1){
                System.out.println(Thread.currentThread().getName()+" is holding
s1");
```

```java
        try{sleep(20);}catch(Exception e){}

            System.out.println(Thread.currentThread().getName()+" is waiting
for s2");


         synchronized (Lock2){

            System.out.println(Thread.currentThread().getName()+" is holding
s1 and s2 Process complete");

          }

        }

      }

}
private static class t2 extends Thread{


    public void run(){



        synchronized (Lock2) {

            System.out.println(Thread.currentThread().getName()+" is holding
s2");



        try{sleep(20);}catch(Exception e){}

            System.out.println(Thread.currentThread().getName()+" is waiting
for s3");



         synchronized (Lock3){

            System.out.println(Thread.currentThread().getName()+" is holding
s3 and s2 Process complete");

        }
```

```
            }
        }
}
private static class t3 extends Thread{

        public void run(){


            synchronized (Lock3) {
                System.out.println(Thread.currentThread().getName()+" is holding
s3");


            try{sleep(20);}catch(Exception e){}
                System.out.println(Thread.currentThread().getName()+" is waiting
for s1");


             synchronized (Lock1){
                System.out.println(Thread.currentThread().getName()+" is holding
s1 and s3 Process complete");
            }
        }
        }
}
}
```

```
c:\java1>java 6p7.java
 Deadlock condition
Thread-2 is holding s3
Thread-1 is holding s2
Thread-0 is holding s1
Thread-1 is waiting for s3
Thread-2 is waiting for s1
Thread-0 is waiting for s2
^C
c:\java1>java 6p7-1.java
Note: 6p7-1.java uses or overrides a deprecated API.
Note: Recompile with -Xlint:deprecation for details.


 Deadlock end by terminating Thread-0
Thread-2 is holding s3
Thread-1 is holding s2
Thread-1 is waiting for s3
Thread-2 is waiting for s1
Thread-2 is holding s1 and s3 Process complete
Thread-1 is holding s3 and s2 Process complete

}c:\java1>
```

Practical 7:

1. Write a Java Program to copy contents from one file into another using FileInputStream & FileOutputStream.

```java
import java.io.*;
class p71{
   public static void main(String[] args) {
      try{
      File in=new File("D:\\html\\New\\1.jpg");
      File out=new File("D:\\html\\New\\2.jpg");
      FileInputStream fin=new FileInputStream(in);
      FileOutputStream fout=new FileOutputStream(out);
      byte[] b=new byte[1024];
      int l;
      while ((l=fin.read(b))>0) {
        fout.write(b,0,l);

      }
      fin.close();
      fout.close();
      System.out.println("copied 1.jpg to 2.jpg");
      }catch(IOException e){ e.printStackTrace();}

   }
}
```
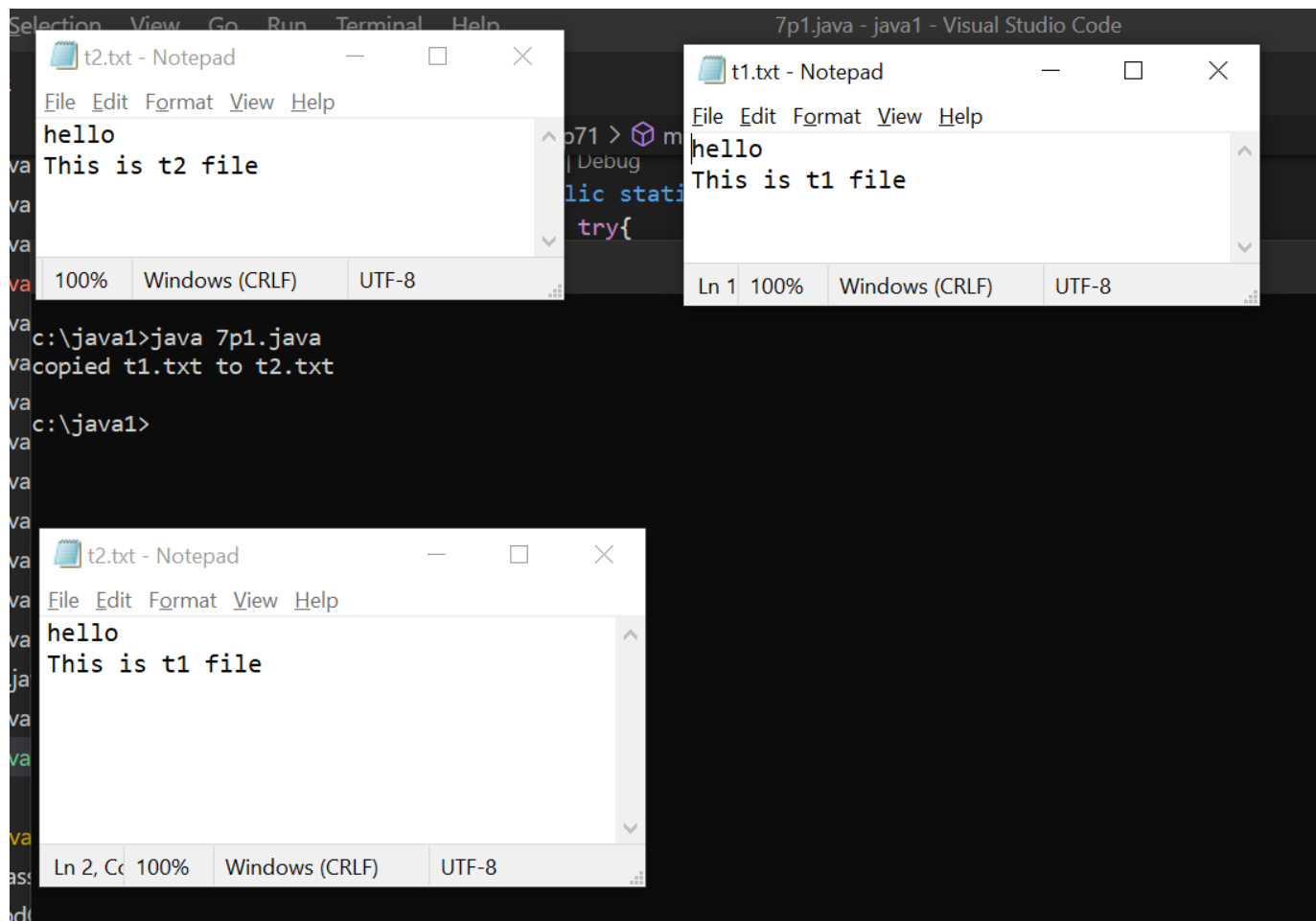
2. Write a Java Program to copy contents from one file into another using BufferedInputStream & BufferedOutputStream.

import java.io.*;

public class p2 {

    public static void main(String[] args) {

        File in=new File("D:\\html\\New\\1.jpg");

        File out=new File("D:\\html\\New\\2.jpg");


        try{

          FileInputStream fin=new FileInputStream(in);

```java
FileOutputStream fout=new FileOutputStream(out);
BufferedInputStream bin=new BufferedInputStream(fin);
 BufferedOutputStream bout=new BufferedOutputStream(fout);
byte[] b=new byte[1024];
int l;
while ((l=bin.read(b))!=-1) {
  bout.write(b,0,l);


}
try{fin.close();
  fout.close();
  bin.close();
  bout.close();
  }catch(IOException e){}




System.out.println("copied 1.jpg to 2.jpg using Bufferd Input/Output Sream");
}catch(IOException e){ e.printStackTrace();}
}


}
```

```
c:\java1>java 7p2.java
copied 1.jpg to 2.jpg using Bufferd Input/Output Sream

c:\java1>
```
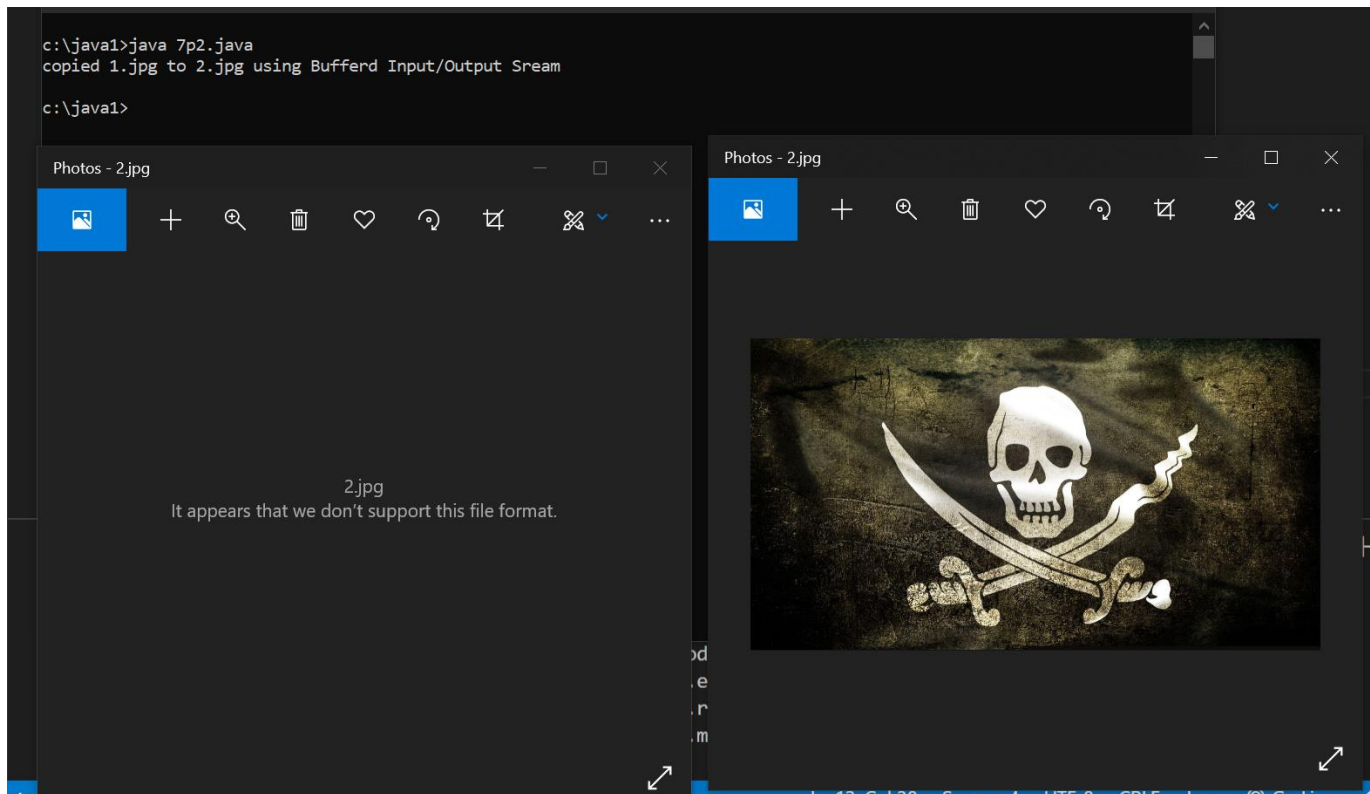
3. WAP to copy contents from a file and arrange the words in ascending order to store in another file using Reader and Writer classes
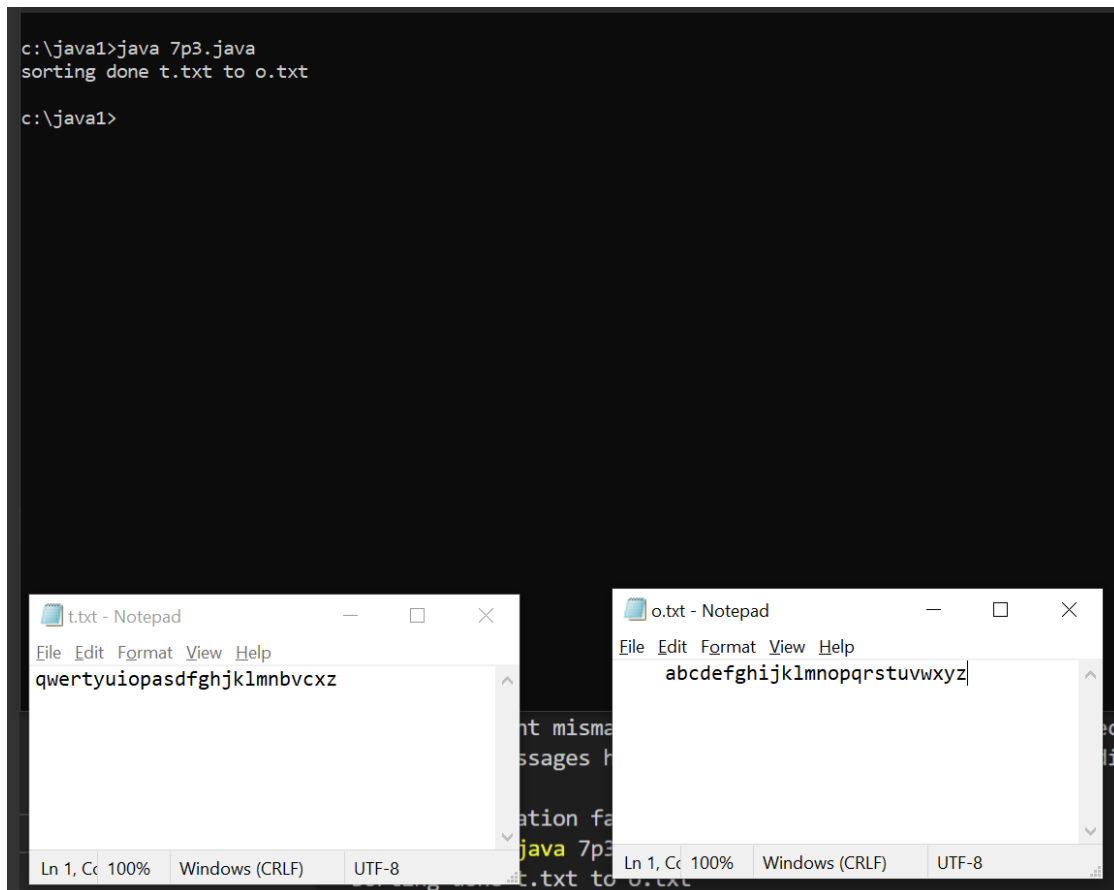
import java.io.*;

import java.util.*;

import java.nio.CharBuffer;

import java.util.Arrays;

public class p3 {

   public static void main(String[] args) {

      int i,j=0;

      char []a=new char[30];

      try{

```java
FileReader fr=new FileReader("D:/html/t.txt");
FileWriter fw= new FileWriter("D:/html/o.txt");
while((i=fr.read())!=-1){


   a[j]=(char)i;
   j++;
}
 Arrays.sort(a);
 fw.write(a);
 //System.out.println("a=%s"+Arrays.toString(a));
 System.out.println("sorting done t.txt to o.txt");
fr.close();
fw.close();
}catch(Exception e){}
}

}
```

4. WAP in Java to use map and store username and password values in properties. Also, retrieve them in program when asked.

import java.util.*;

import java.io.*;

public class p744{

   public static void main(String[] args) {

      Properties p=new Properties();

      Map<String,String> hm=new HashMap<String,String>();

      hm.put("@aftab", "Aa1");

```java
hm.put("@aftab1", "Aa12");
hm.put("@aftab2", "Aa123");
hm.put("@aftab3", "Aa1234");
for(Map.Entry<String, String> me : hm.entrySet())
{
    p.setProperty(me.getKey(), me.getValue());
    //  System.out.println(me.getKey()+":"+me.getValue());
}
try{

    p.store(new FileWriter("D:/html/p.txt"), "usernames and passwords");
}catch(Exception e){}
System.out.println("username : value");


// System.out.println(p.toString());
Set set=p.entrySet();
Iterator itr=set.iterator();
while (itr.hasNext()) {
    Map.Entry entry=(Map.Entry)itr.next();
    System.out.println(entry.getKey()+":"+entry.getValue());
}
// for(Map.Entry<String, String> me : hm.entrySet())
// {
//    //  System.out.println(hm);
//      System.out.println(me.getKey()+":"+me.getValue());
// }
}
```

}

```
Command Prompt

c:\java1>java 7.4.java
username : value
@aftab1:Aa12
@aftab2:Aa123
@aftab3:Aa1234
@aftab:Aa1

c:\java1>
```

5. WAP in Java to implement HashMap and perform operations to insert if not present, replace & delete data. Also, iterate over each pair.

import java.util.*;

public class p755 {

   public static void main(String[] args) {

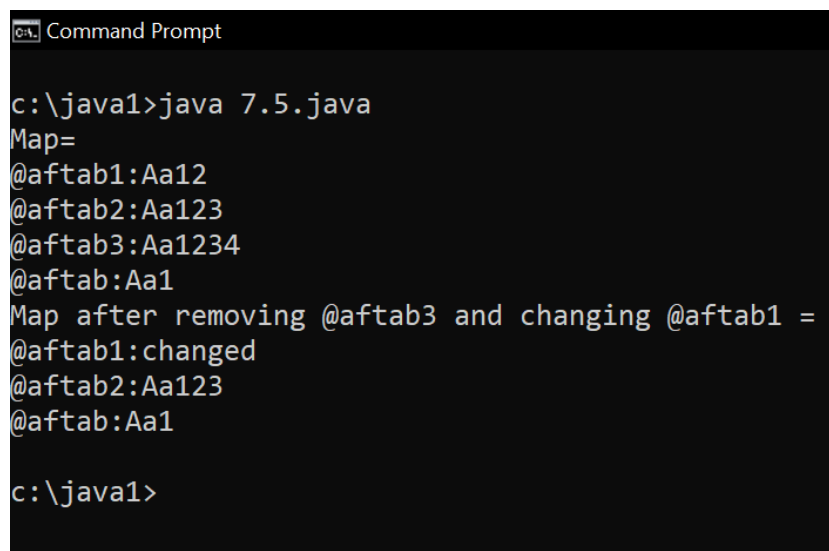   Map<String,String> hm=new HashMap<String,String>();

      hm.put("@aftab", "Aa1");

      hm.put("@aftab1", "Aa12");

      hm.put("@aftab2", "Aa123");

      hm.put("@aftab3", "Aa1234");

      System.out.println("Map=");

```java
    for(Map.Entry<String, String> me : hm.entrySet())

    {

        //   System.out.println(hm);

            System.out.println(me.getKey()+":"+me.getValue());

    }

    hm.put("@aftab1", "changed");

    hm.remove("@aftab3");

    System.out.println("Map after removing @aftab3 and changing @aftab1 =
");

    for(Map.Entry<String, String> me : hm.entrySet())

    {

        //   System.out.println(hm);

            System.out.println(me.getKey()+":"+me.getValue());

    }

  }

}
```

```
Command Prompt

c:\java1>java 7.5.java
Map=
@aftab1:Aa12
@aftab2:Aa123
@aftab3:Aa1234
@aftab:Aa1
Map after removing @aftab3 and changing @aftab1 =
@aftab1:changed
@aftab2:Aa123
@aftab:Aa1

c:\java1>
```
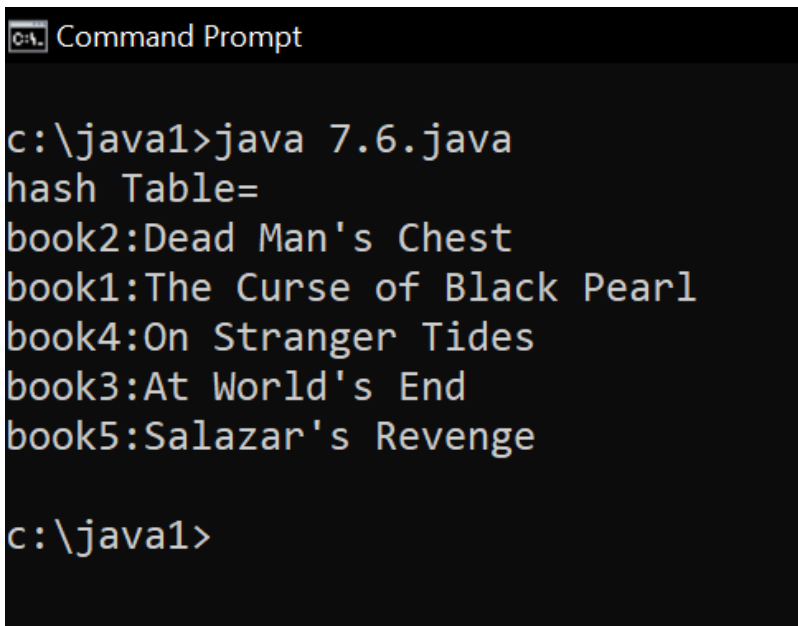
6. WAP in Java to implement HashTable to store details of books in a library & retrieve them

```java
import java.util.*;
import java.io.*;
public class p766 {
    public static void main(String[] args) {
        Hashtable<String,String> ht=new Hashtable<String,String>();
        Properties p=new Properties();
        ht.put("book1", "The Curse of Black Pearl");
        ht.put("book2", "Dead Man's Chest");
        ht.put("book3", "At World's End");
        ht.put("book4", "On Stranger Tides");
        ht.put("book5", "Salazar's Revenge");
        for(Map.Entry<String, String> me : ht.entrySet())
        {
            p.setProperty(me.getKey(), me.getValue());
            //  System.out.println(me.getKey()+":"+me.getValue());
        }
        try{

            p.store(new FileWriter("D:/html/library.txt"), "library");
        }catch(Exception e){}
        System.out.println("hash Table=");
        // for(Map.Entry<String, String> me : ht.entrySet())
```

```java
// {
//        System.out.println(me.getKey()+":"+me.getValue());
// }
Set set=p.entrySet();
Iterator itr=set.iterator();
while (itr.hasNext()) {
    Map.Entry entry=(Map.Entry)itr.next();
    System.out.println(entry.getKey()+":"+entry.getValue());
}
    }
}
```

```
Command Prompt

c:\java1>java 7.6.java
hash Table=
book2:Dead Man's Chest
book1:The Curse of Black Pearl
book4:On Stranger Tides
book3:At World's End
book5:Salazar's Revenge

c:\java1>
```

CHALLENGE PROGRAMS:

1. Recursively print nos. from 0 to n such that only one parameter is passed to recursive function.

```java
import java.util.*;

public class Main {

public static int karo(int n) {

            int i;

        for(i=0;i<=n;i++){

            System.out.print("  "+i);

        }

        return n;

    }


        public static void main(String[] args) {

        Scanner sc= new Scanner(System.in);

        System.out.println("Enter number=");
```
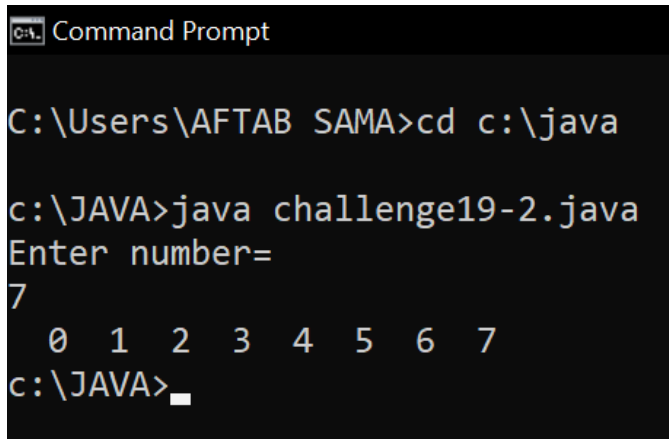
```
        int n= sc.nextInt();

         karo( n);

        }

}
```

```
Command Prompt

C:\Users\AFTAB SAMA>cd c:\java

c:\JAVA>java challenge19-2.java
Enter number=
7
  0  1  2  3  4  5  6  7
c:\JAVA>
```

2. WAP to recursively remove repeating characters in a string given by user.

```java
import java.io.*;

class cp2{
   public static String rr(String input) {
      if(input.length()<=1)
         return input;
      if(input.charAt(0)==input.charAt(1))
         return rr(input.substring(1));
      else
         return input.charAt(0) + rr(input.substring(1));
   }
   public static void main(String[] args)
   {
      String S1 = "aafftabb";
      System.out.println(rr(S1));

      String S2 = "ssamma";
      System.out.println(rr(S2));
   }
```
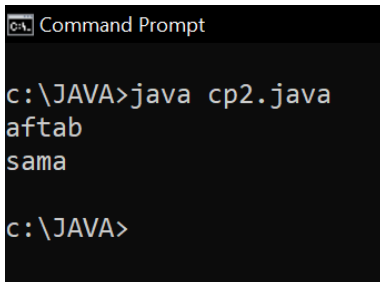
}

3. Starting with 1st Jan 2000, any other date when entered should give day.

```java
import java.util.*;
class day{
        public static void main(String[] args) {
                Scanner sc=new Scanner(System.in);
                int i,j,n,d,m,y;
                int c=2020,day;
                int x[]=new int[12];
                System.out.println("Day=");
                d=sc.nextInt();
                System.out.println("Month=");
                m=sc.nextInt();
                System.out.println("Year=");
                y=sc.nextInt();


        x[0]=4;
          x[1]=0;
```
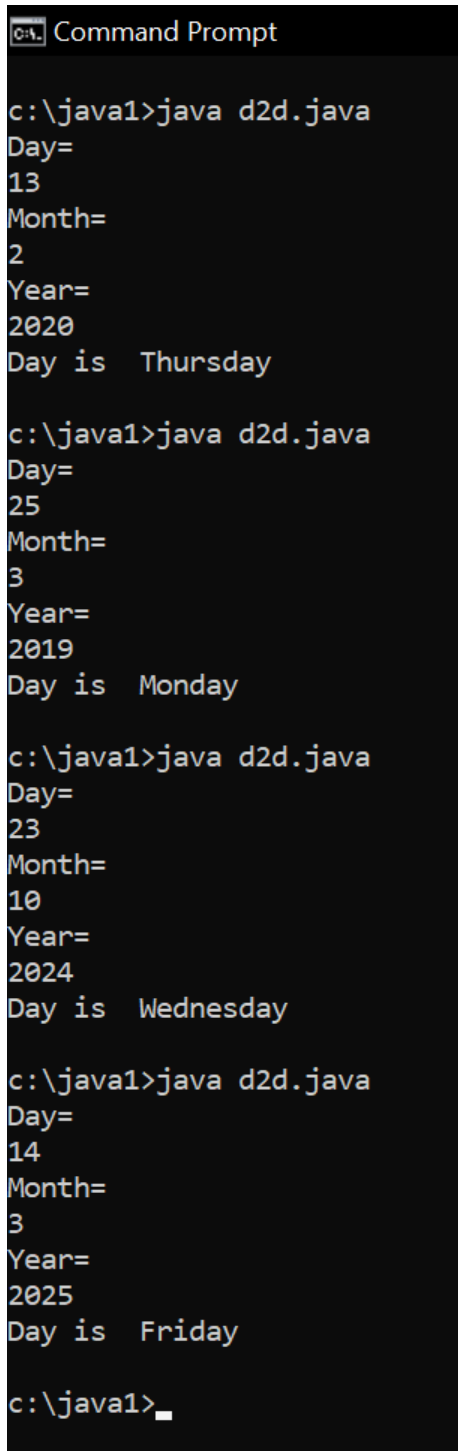
```java
x[2]=0;
x[3]=3;
x[4]=5;
x[5]=1;
x[6]=3;
x[7]=6;
x[8]=2;
x[9]=4;
x[10]=0;
x[11]=2;
if (y>2021) {
   for (i=0;y>2021 ;i++ ) {
       for (j=0;j<12 ;j++ ) {
             x[j]++;
           }
       if (y%4==0) {
             for (j=2;j<12 ;j++ ) {
               x[j]++;
           }
        }
       if ((y-1)%4==0) {
             for (j=0;j<2;j++ ) {
               x[j]++;
           }
        }
       y--;
    }
```

```
        }
      if (y<2021){
        for(;y<2021;){
          for (n=0;n<12 ;n++ ) {
                    if(x[n]==0) {  x[n]=7;  }   x[n]--;
              }
          if (y % 4 ==0) {  for ( i=0;i<2 ;i++ ) {
                    if(x[i]==0) {  x[i]=7;  }    x[i]--;


          }


          }
          if ((y+1) % 4 == 0) { for (n=2;n<12 ;n++ ) {
                       if(x[n]==0) {  x[n]=7;  }    x[n]--;


          }


          }


             y++;


              }
          }
```

```java
   day=d+x[m-1];
  for (i=0;day>7 ; ) {
     day=day-7;
     }
  if (day==1) {
        System.out.println("Day is  Monday");
     }
  if (day==2) {
        System.out.println("Day is  Tuesday");
     }
    if (day==3) {
        System.out.println("Day is  Wednesday");
     }
    if (day==4) {
        System.out.println("Day is  Thursday");
     }
    if (day==5) {
        System.out.println("Day is  Friday");
     }
    if (day==6) {
        System.out.println("Day is  Saturday");
     }
    if (day==7) {
        System.out.println("Day is  Sunay");
     }
```

```
        }

}
```

```
Command Prompt

c:\java1>java d2d.java
Day=
13
Month=
2
Year=
2020
Day is  Thursday

c:\java1>java d2d.java
Day=
25
Month=
3
Year=
2019
Day is  Monday

c:\java1>java d2d.java
Day=
23
Month=
10
Year=
2024
Day is  Wednesday

c:\java1>java d2d.java
Day=
14
Month=
3
Year=
2025
Day is  Friday

c:\java1>_
```

4. WAP in Java to create custom exception, call the exception, rethrow it and handle the exception.

```java
class TestCustomException1{

  static void validate(int age)throws InvalidAgeException{
    if(age<18)
     throw new InvalidAgeException("not valid");
    else
     System.out.println("welcome to vote");
  }

  public static void main(String args[]){
    try{
    validate(13);
    }catch(Exception m){System.out.println("Exception occured: "+m);}


  }
}
class InvalidAgeException extends Exception{
 InvalidAgeException(String s){
  super(s);
```
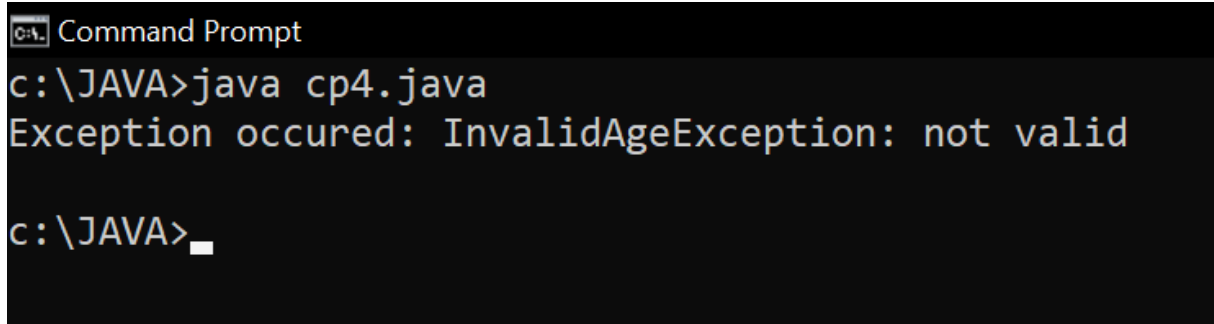
```
    }
}
```

```
Command Prompt
c:\JAVA>java cp4.java
Exception occured: InvalidAgeException: not valid

c:\JAVA>_
```

--------------------------------------*--

The End