

1. Find the Largest and Smallest Element

- Given an array, find the smallest and largest elements in it.

Ans:

Input:

```
class LargeSmall{  
    public static void main(String args[]){  
        int a[] = {1, 2, 3, 4, 5};  
        System.out.print("Numbers are: ");  
        for (int i = 0; i <5; i++)  
        {  
            System.out.print(a[i] + ",");  
        }  
        System.out.println(" ");  
        int max=0;  
        int min=1;  
        for(int i = 0; i <5; i++)  
        {  
            max=((a[i])>max)?a[i]:max;  
            min=((a[i])<min)?a[i]:min;  
        }  
        System.out.println("Largest number is "+max+" and samllest is "+min);  
    }  
}
```

Output:

```
C:\Windows\System32\cmd.e  X + v
D:\cdac\PG-DAC\java\assignmnet\Assignment 3>javac LargeSmall.java
D:\cdac\PG-DAC\java\assignmnet\Assignment 3>java LargeSmall
Numbers are: 1,2,3,4,5,
Largest number is 5 and samllest is 1
```

2. Reverse an Array

- Reverse the given array in place.

Ans:

Input:

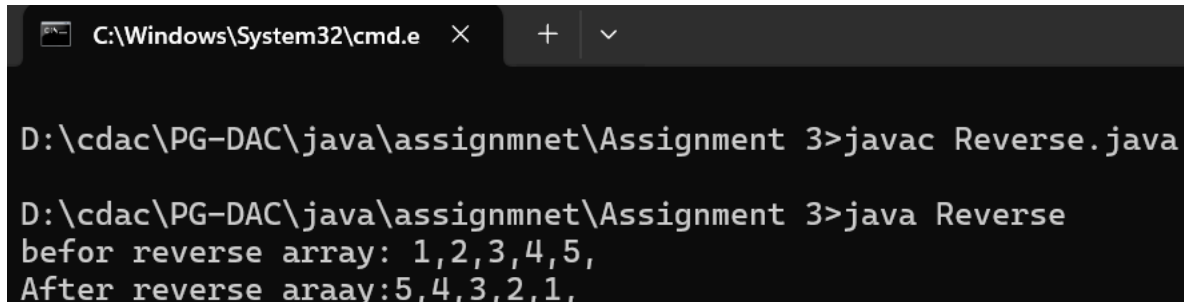
```
class Reverse{
    public static void main(String args[]){
        int a[] = {1, 2, 3, 4, 5};
        int r[] = new int[5];
        System.out.print("befor reverse array: ");
        for (int i = 0; i <5; i++)
        {
            System.out.print(a[i] + ",");
        }
        System.out.println();
        for (int i = 0; i <5; i++)
        {
            r[i]=a[4-i];
        }

        System.out.print("After reverse araay:");
        for (int i = 0; i <5; i++)
        {
            System.out.print(r[i] + ",");
        }
    }
}
```

```
}
```

```
}
```

Output:



```
C:\Windows\System32\cmd.e  X  +  v

D:\cdac\PG-DAC\java\assignmnet\Assignment 3>javac Reverse.java

D:\cdac\PG-DAC\java\assignmnet\Assignment 3>java Reverse
befor reverse array: 1,2,3,4,5,
After reverse araaay:5,4,3,2,1,
```

3. Find the Second Largest Element

- Find the second-largest element in the given array.

Ans:

Input:

```
class SecLarge{
    public static void main(String args[]){
        int a[] = {1, 2, 3, 4, 5};
        System.out.print("Numbers are: ");
        for (int i = 0; i <5; i++)
        {
            System.out.print(a[i] + ",");
        }
        System.out.println(" ");
        int max=0;
        int max1=0;
        for(int i = 0; i <5; i++)
        {
            max=((a[i])>max)?a[i]:max;
        }
    }
}
```

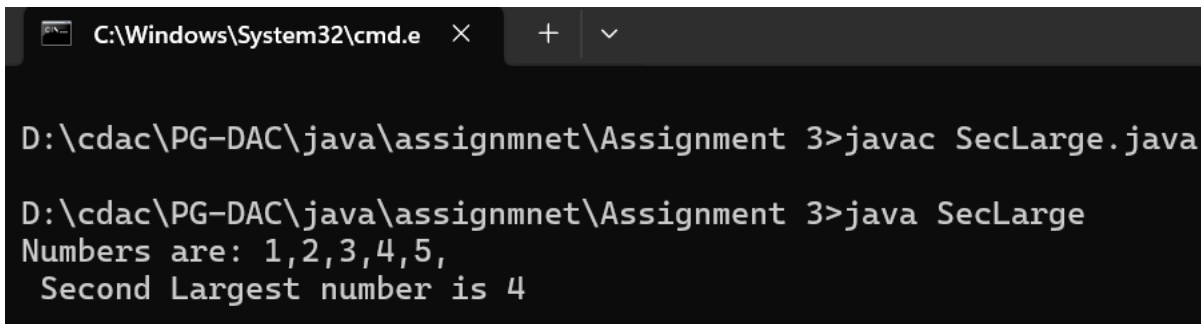
```

        for(int i = 0; i < 5; i++)
        {
            if((a[i])>max1)
            {
                if((a[i])<max)
                {
                    max1=a[i];
                }
            }
        }

        System.out.println(" Second Largest number is "+max1);
    }
}

```

Output:



```

C:\Windows\System32\cmd.e
D:\cdac\PG-DAC\java\assignmnet\Assignment 3>javac SecLarge.java
D:\cdac\PG-DAC\java\assignmnet\Assignment 3>java SecLarge
Numbers are: 1,2,3,4,5,
Second Largest number is 4

```

4. Count Even and Odd Numbers

- Count the number of even and odd numbers in an array.

Ans:

Input:

```

class EvenOdd{

    public static void main(String args[]){

        int a[] = {1, 2, 3, 4, 5};
    }
}

```

```

        int evencount = 0;

        int oddcount = 0;

        System.out.print("Numbers are: ");

        for (int i = 0; i <5; i++)

        {

            System.out.print(a[i] + ",");

                if(((a[i])%2)==0)

                {

                    evencount++;

                }

                else

                {

                    oddcount++;

                }

            }

        }

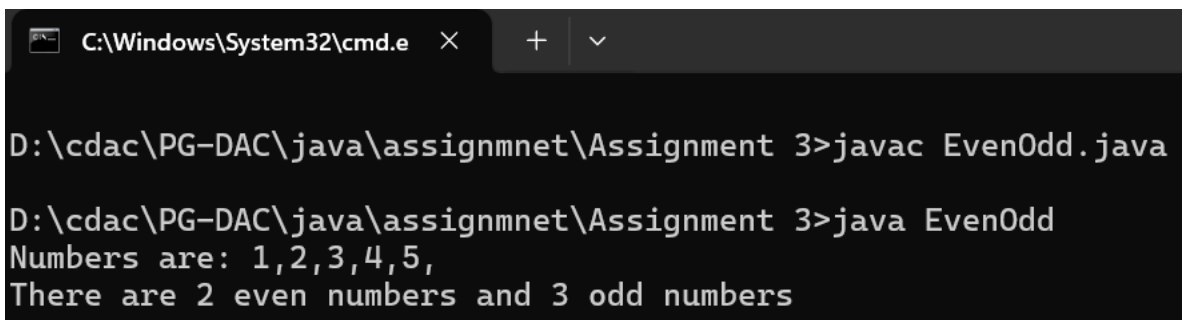
        System.out.println("There are "+evencount+" even numbers and
        "+oddcount+" odd numbers");

    }

}

```

Output:



```

C:\Windows\System32\cmd.e  X  +  v

D:\cdac\PG-DAC\java\assignmnet\Assignment 3>javac EvenOdd.java

D:\cdac\PG-DAC\java\assignmnet\Assignment 3>java EvenOdd
Numbers are: 1,2,3,4,5,
There are 2 even numbers and 3 odd numbers

```

5. Find Sum and Average

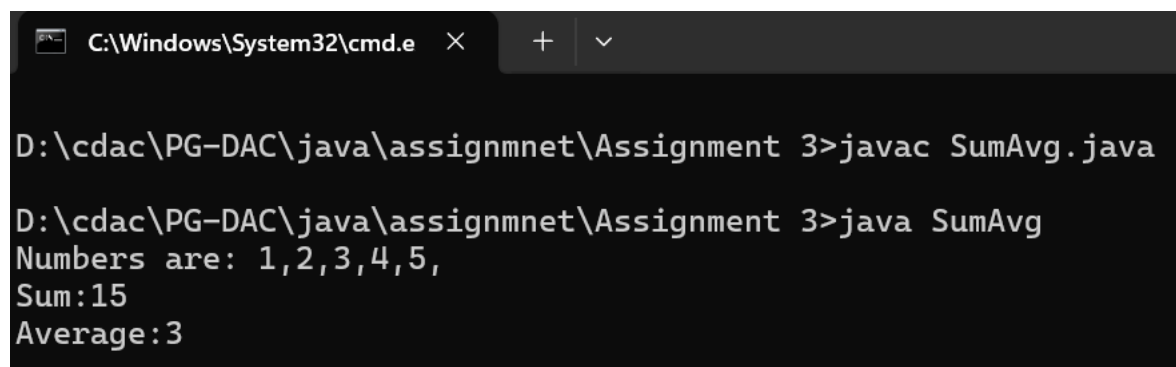
- **Compute the sum and average of all elements in the array.**

Ans:

Input:

```
class SumAvg{  
    public static void main(String args[]){  
        int a[] = {1, 2, 3, 4, 5};  
        int sum = 0;  
        int avg = 0;  
  
        System.out.print("Numbers are: ");  
        for (int i = 0; i <5; i++)  
        {  
            System.out.print(a[i] + ",");  
            sum += a[i];  
        }  
        System.out.println();  
        avg=sum/a.length;  
  
        System.out.println("Sum:"+sum);  
        System.out.println("Average:"+avg);  
    }  
}
```

Output:



The screenshot shows a Windows command prompt window with the title bar 'C:\Windows\System32\cmd.e'. The command prompt is open at the directory 'D:\cdac\PG-DAC\java\assignmnet\Assignment'. The user has entered the command 'javac SumAvg.java' to compile the program. The output of the compilation is not shown. The user then enters the command 'java SumAvg' to run the program. The output of the program is displayed as follows:

```
D:\cdac\PG-DAC\java\assignmnet\Assignment 3>javac SumAvg.java  
  
D:\cdac\PG-DAC\java\assignmnet\Assignment 3>java SumAvg  
Numbers are: 1,2,3,4,5,  
Sum:15  
Average:3
```

6. Remove Duplicates from a Sorted Array

- Remove duplicate elements from a sorted array without using extra space.

Ans:

Input:

```
class Duplicates{  
    public static void main(String args[]){  
        int a[] = {5,4,3,3,1,1,2,4};  
        System.out.print("Numbers Before sorting: ");  
        for (int i = 0; i <a.length; i++)  
        {  
            System.out.print(a[i] + ",");  
        }  
        System.out.println();  
        for(int i=0;i<a.length-1;i++)  
        {  
            for(int j=0;j<a.length-1-i;j++)  
            {  
                if(a[j]>a[j+1])  
                {  
                    int temp = a[j];  
                    a[j] = a[j+1];  
                    a[j+1] = temp;  
                }  
            }  
        }  
        System.out.print("Numbers After sorting: ");  
  
        for (int i = 0; i <a.length; i++)
```

```

        {
System.out.print(a[i] + ",");
        }
System.out.println();

int count=0;
for(int i=0;i<a.length-1;i++)
{
    for(int j=0;j<a.length-1-i;j++)
    {
        if(a[j]==a[j+1])
        {
            a[j+1]=0;
            count++;
        }
    }
}

System.out.print("Numbers before duplicate removal: ");
for (int i = 0; i <a.length; i++)
{
System.out.print(a[i] + ",");
}
System.out.println();

int d[]= new int[a.length-count];

int index = 0;
for (int i = 0; i < a.length; i++)

```



```

        {
    if (a[i] != 0)
        {
            d[index++] = a[i];
        }
    }
}

    System.out.println();

    System.out.print("Numbers After removing duplicate: ");

    for (int i = 0; i < d.length; i++)
    {
        System.out.print(d[i] + ",");
    }

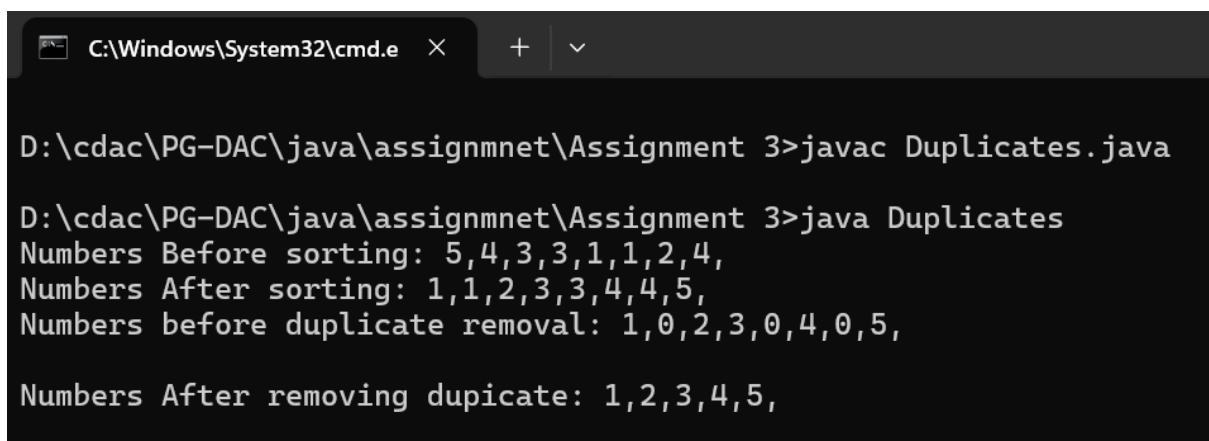
    System.out.println();

}

}

```

Output:



```

C:\Windows\System32\cmd.e  ×  +  ∨

D:\cdac\PG-DAC\java\assignmnet\Assignment 3>javac Duplicates.java

D:\cdac\PG-DAC\java\assignmnet\Assignment 3>java Duplicates
Numbers Before sorting: 5,4,3,3,1,1,2,4,
Numbers After sorting: 1,1,2,3,3,4,4,5,
Numbers before duplicate removal: 1,0,2,3,0,4,0,5,

Numbers After removing duplicate: 1,2,3,4,5,

```

7. Rotate an Array

- Rotate the array to the right by k positions.

Ans:

Input:

```
class Rotate{  
    public static void main(String args[]){  
        int a[]={1,2,3,4,5,6,7};  
        int r[]= new int[7];  
        int k=4;  
        int count=0;  
        System.out.print("Array berfore rotate: ");  
        for(int i=0;i<a.length-1;i++)  
        {  
            System.out.print(a[i]+" ");  
        }  
        System.out.println();  
        for (int i = 0; i < a.length; i++)  
        {  
            r[(i + k) % a.length] = a[i];  
        }  
        System.out.print("Array after rotate: ");  
        for(int i=0;i<a.length-1;i++)  
        {  
            System.out.print(r[i]+" ");  
        }  
    }  
}
```

Output:

```
C:\Windows\System32\cmd.e  X + v

D:\cdac\PG-DAC\java\assignmnet\Assignment 3>javac Rotate.java

D:\cdac\PG-DAC\java\assignmnet\Assignment 3>java Rotate
Array berfore rotate: 1 2 3 4 5 6
Array after rotate: 4 5 6 7 1 2
```

8. Merge Two Sorted Arrays

- Merge two sorted arrays into a single sorted array without using extra space.

Ans:

Input:

```
class Merge{

    public static void main(String args[]){

        int a[] = {1, 2, 3, 4, 5};

        int b[] = {11,12,13,14,15,16};

        int merge[] = new int [11];

        System.out.println("2 array before merge");

        System.out.print("Array A: ");

        for (int i = 0; i <5; i++)

            {

                System.out.print(a[i] + ",");

                merge[i]=a[i];

            }

        System.out.println();

        System.out.print("Array B: ");

        for (int i = 0; i <5; i++)

            {

                System.out.print(b[i] + ",");

                merge[i+5]=b[i];

            }

    }

}
```

```

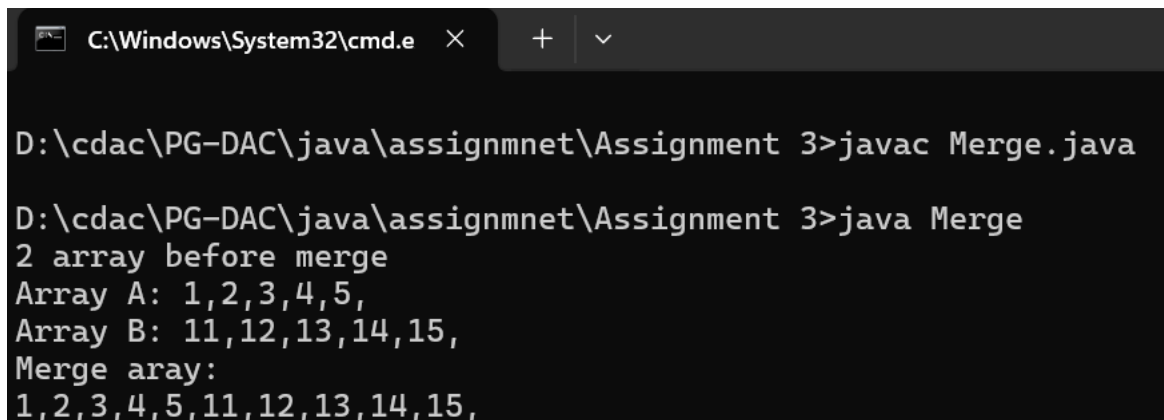
        System.out.println();

        System.out.println("Merge array:");
        for (int i = 0; i < merge.length-1; i++)
        {
            System.out.print(merge[i] + ",");
        }

    }
}

```

Output:



```

C:\Windows\System32\cmd.e  X  +  v

D:\cdac\PG-DAC\java\assignmnet\Assignment 3>javac Merge.java

D:\cdac\PG-DAC\java\assignmnet\Assignment 3>java Merge
2 array before merge
Array A: 1,2,3,4,5,
Array B: 11,12,13,14,15,
Merge array:
1,2,3,4,5,11,12,13,14,15,

```

9. Find Missing Number in an Array

- Given an array of size n-1 containing numbers from 1 to n, find the missing number.

Ans:

Input:

```

class MissingNumbers{
    public static void main(String args[]){
        int a[] = {1, 2, 4, 5};
        int n = a.length + 1;
        int totalSum = (n * (n + 1)) / 2;
        int arraySum = 0;
    }
}

```

```

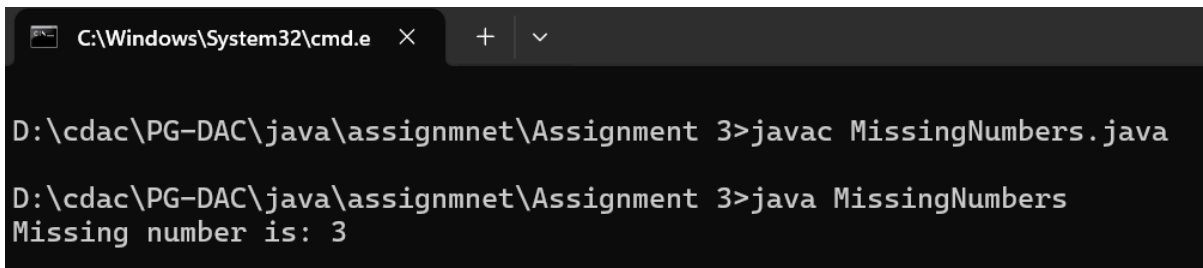
        for (int i = 0; i < a.length; i++)
        {
            arraySum += a[i];
        }

        int missingNumber = totalSum - arraySum;

        System.out.println("Missing number is: " + missingNumber);
    }
}

```

Output:



```

C:\Windows\System32\cmd.e  X  +  v

D:\cdac\PG-DAC\java\assignmnet\Assignment 3>javac MissingNumbers.java

D:\cdac\PG-DAC\java\assignmnet\Assignment 3>java MissingNumbers
Missing number is: 3

```

10. Find Intersection and Union of Two Arrays

- Find the intersection and union of two unsorted arrays.

Ans:

Input:

```

class IntersectionUnion {
    public static void main(String args[]) {
        int a[] = {1, 2, 3, 4, 6};
        int b[] = {1, 2, 5, 7};
        int s = (a.length < b.length) ? a.length : b.length;
        int inter[] = new int[s];
        int union[] = new int[a.length + b.length];
        int interIndex = 0;
    }
}

```

```
int unionIndex = 0;
```

```
System.out.println("a= {1,2,3,4,6}");
```

```
System.out.println("b= {1,2,5,7}");
```

```
// Finding intersection
```

```
for (int i = 0; i < a.length; i++) {  
    for (int j = 0; j < b.length; j++) {  
        if (a[i] == b[j]) {  
            inter[interIndex++] = a[i];  
            break;  
        }  
    }  
}
```

```
System.out.print("Intersection of array A and B: ");
```

```
for (int i = 0; i < interIndex; i++) {  
    System.out.print(inter[i] + " ");  
}  
System.out.println();
```

```
// Finding union
```

```
for (int i = 0; i < a.length; i++) {  
    union[unionIndex++] = a[i];  
}  
  
for (int i = 0; i < b.length; i++) {  
    boolean found = false;  
    for (int j = 0; j < a.length; j++) {  
        if (b[i] == a[j]) {
```

```

        found = true;
        break;
    }
}
if (!found) {
    union[unionIndex++] = b[i];
}
}

// Sorting union array
for (int i = 0; i < unionIndex - 1; i++) {
    for (int j = 0; j < unionIndex - 1 - i; j++) {
        if (union[j] > union[j + 1]) {
            int temp = union[j];
            union[j] = union[j + 1];
            union[j + 1] = temp;
        }
    }
}

```

```

System.out.print("Union after sorting: ");
for (int i = 0; i < unionIndex; i++) {
    System.out.print(union[i] + " ");
}
System.out.println();
}
}

```

Output:

```
C:\Windows\System32\cmd.e  ×  +  v
D:\cdac\PG-DAC\java\assignmnet\Assignment 3>javac IntersectionUnion.java
D:\cdac\PG-DAC\java\assignmnet\Assignment 3>java IntersectionUnion
a= {1,2,3,4,6}
b= {1,2,5,7}
Intersection of array A and B: 1 2
Union after sorting: 1 2 3 4 5 6 7
```

11. Find a Subarray with Given Sum

- Given an array of integers, find the subarray that sums to a given value S.

Ans:

Input:

```
class Sum{
    public static void main(String args[]){
        int a[] = {1, 2, 4, 5,6,7};
        int s[]= new int[a.length];
        int sum=0;
        int S=12;
        for(int i=0;i<=a.length-1;i++)
        {
            if(sum<=S)
            {
                sum += a[i];
                s[i]=a[i];
                if(sum==S)
                {
                    System.out.println(S+" Found as sum of sub string");
                    for(int f=0;f<=i;f++)
                    {
                        System.out.print(s[f]+" ");
                    }
                }
            }
        }
    }
}
```



```
class FindDisplay{  
    public static void main(String args[]){  
        Scanner input = new Scanner(System.in);  
        int a[] = new int[20];  
        int even[]= new int[20];  
        int odd[]= new int[20];  
        int mult[]= new int[20];  
        int evencount=0;  
        int oddcount=0;  
        int multcount=0;  
        for(int i=0;i<20;i++)  
        {  
            System.out.println("Enter the number");  
            a[i]=input.nextInt();  
        }  
  
        for(int i=0;i<20;i++)  
        {  
            if((a[i]%2)==0)  
            {  
                even[evencount]=a[i];  
                evencount++;  
            }  
            else  
            {  
                odd[oddcount]=a[i];  
                oddcount++;  
            }  
            if((a[i]%3)==0)
```

```

        {
            mult[multcount]=a[i];
            multcount++;
        }
    }

    System.out.println("There are "+evencount+" even numbers They are");
    for(int i=0;i<evencount;i++)
    {
        System.out.print(even[i]+" ");
    }
    System.out.println();

    System.out.println("There are "+oddcount+" odd numbers They are");
    for(int i=0;i<oddcount;i++)
    {
        System.out.print(odd[i]+" ");
    }
    System.out.println();

    System.out.println("There are "+multcount+" mutiple of 3 They are");
    for(int i=0;i<multcount;i++)
    {
        System.out.print(mult[i]+" ");
    }
}

}

```

Output:

```
C:\Windows\System32\cmd.e  X  +  v
9
Enter the number
10
Enter the number
11
Enter the number
12
Enter the number
13
Enter the number
14
Enter the number
15
Enter the number
16
Enter the number
17
Enter the number
18
Enter the number
19
Enter the number
20
There are 10 even numbers They are
2 4 6 8 10 12 14 16 18 20
There are 10 odd numbers They are
1 3 5 7 9 11 13 15 17 19
There are 6 mutiple of 3 They are
3 6 9 12 15 18
```

13. Write a program to accept the marks in Physics, Chemistry and Maths secured by 20 class students in a single Dimensional Array. Find and display the following:

- **Number of students securing 75% and above in aggregate.**
- **Number of students securing 40% and below in aggregate.**

Ans:

Input:

```
import java.util.Scanner;

class Aggregate{

    public static void main(String args[]){

        Scanner input = new Scanner(System.in);
```

```

int p[]= new int[20];
int c[]= new int[20];
int m[]= new int[20];
for(int i=0;i<20;i++)
{
    System.out.println("Enter the marks for Physics, Chemistry and Maths
od student "+i);

    p[i]= input.nextInt();
    c[i]= input.nextInt();
    m[i]= input.nextInt();
}

int above75 =0;
int below45 =0;
for(int i=0;i<20;i++)
{
    int total=p[i]+c[i]+m[i];
    double agg= total/3;
    if(agg>=75)
    {
        above75++;
    }
    else if(agg<=45)
    {
        below45++;
    }
}

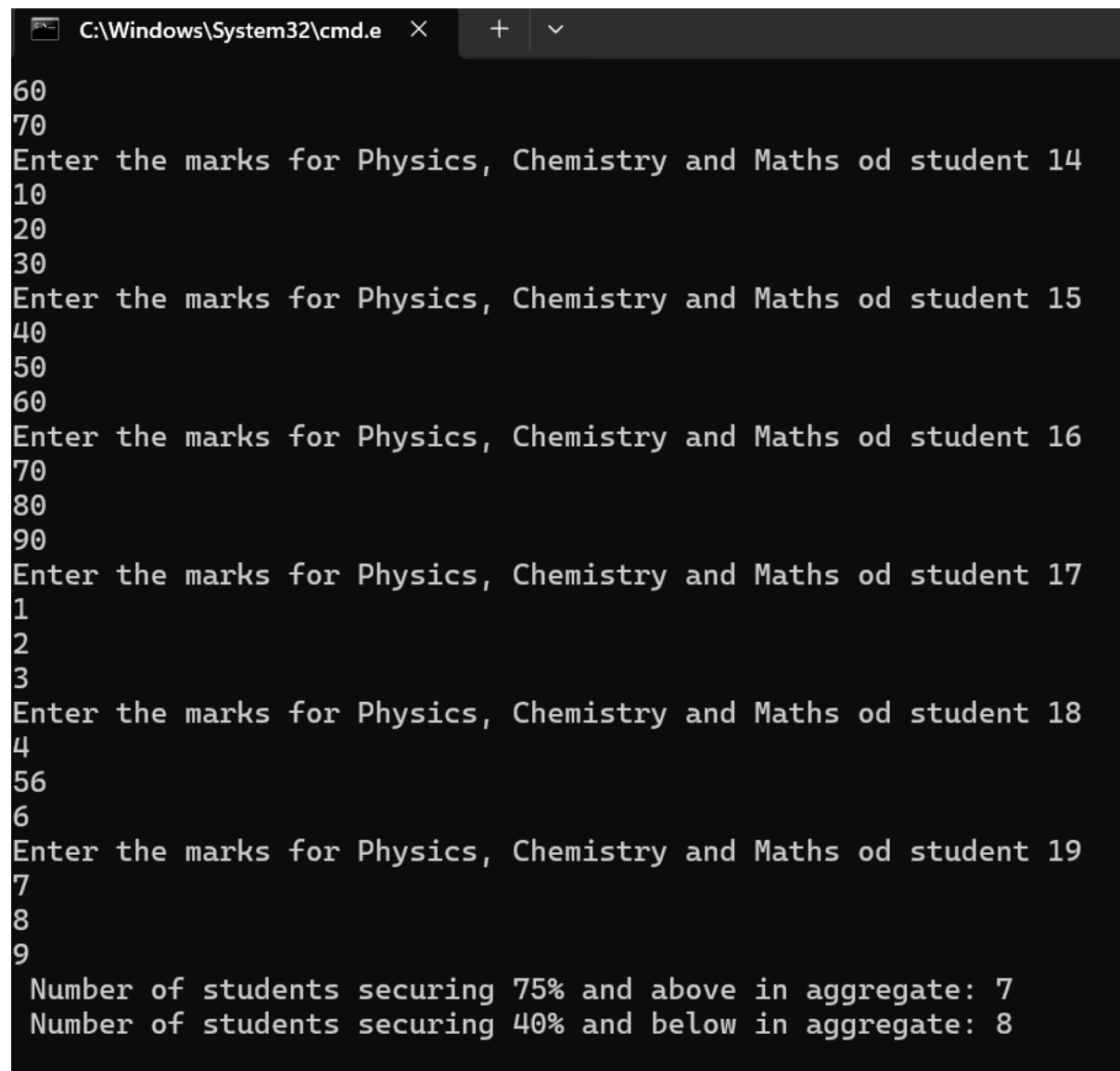
System.out.println(" Number of students securing 75% and above in
aggregate: "+ above75);

```

```
        System.out.println(" Number of students securing 40% and below in  
aggregate: "+below45);
```

```
    }  
}
```

Output:



```
C:\Windows\System32\cmd.e  X  +  v  
60  
70  
Enter the marks for Physics, Chemistry and Maths od student 14  
10  
20  
30  
Enter the marks for Physics, Chemistry and Maths od student 15  
40  
50  
60  
Enter the marks for Physics, Chemistry and Maths od student 16  
70  
80  
90  
Enter the marks for Physics, Chemistry and Maths od student 17  
1  
2  
3  
Enter the marks for Physics, Chemistry and Maths od student 18  
4  
56  
6  
Enter the marks for Physics, Chemistry and Maths od student 19  
7  
8  
9  
Number of students securing 75% and above in aggregate: 7  
Number of students securing 40% and below in aggregate: 8
```

14. Write a program in Java to accept 20 numbers in a single dimensional array arr[20]. Transfer and store all the even numbers in an array even[] and all the odd numbers in another array odd[]. Finally, print the elements of the even & the odd array.

Ans:

Input:

```
import java.util.Scanner;

class Even{

    public static void main(String args[]){

        Scanner input = new Scanner(System.in);

        int[] a= new int[20];
        int[] even= new int[20];
        int[] odd= new int[20];
        int evencount=0;
        int oddcount=0;
        for(int i=0;i<20;i++)
        {

            System.out.println("Enter the number");
            a[i]=input.nextInt();
            if((a[i]%2)==0)
            {

                even[evencount]=a[i];
                evencount++;

            }
            else
            {

                odd[oddcount]=a[i];
                oddcount++;

            }
        }

        System.out.println("Even numbers are: ");
        for(int i=0;i<evencount;i++)
        {

            System.out.print(even[i]+" ");

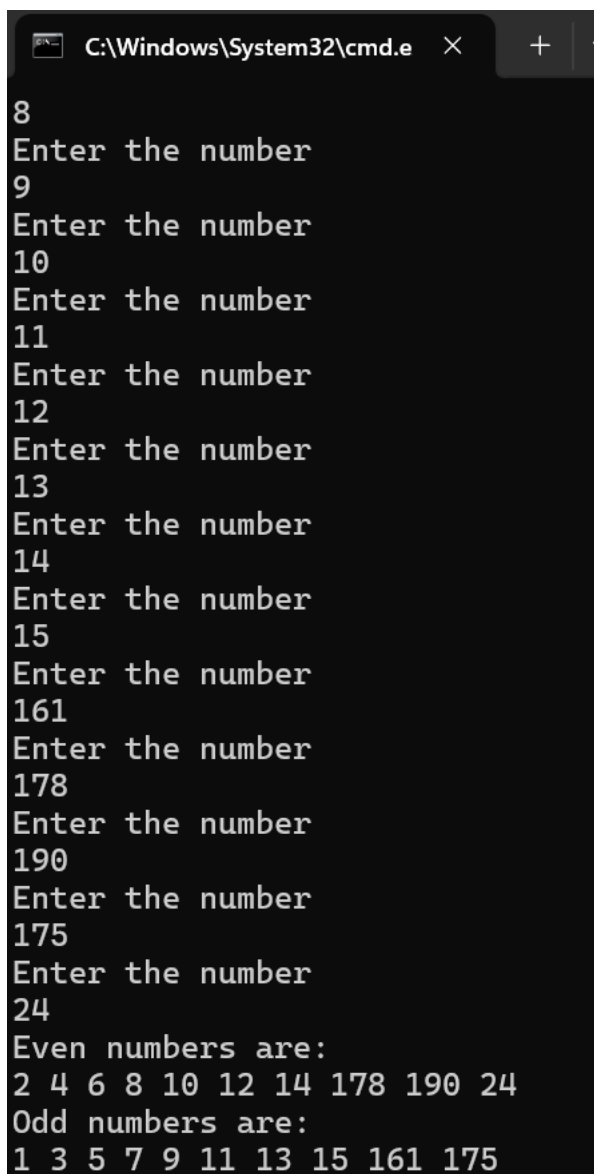
        }

    }

}
```

```
        System.out.println();  
        System.out.println("Odd numbers are: ");  
        for(int i=0;i<oddcount;i++)  
        {  
            System.out.print(odd[i]+" ");  
        }  
    }  
}
```

Output:



```
C:\Windows\System32\cmd.e  
8  
Enter the number  
9  
Enter the number  
10  
Enter the number  
11  
Enter the number  
12  
Enter the number  
13  
Enter the number  
14  
Enter the number  
15  
Enter the number  
161  
Enter the number  
178  
Enter the number  
190  
Enter the number  
175  
Enter the number  
24  
Even numbers are:  
2 4 6 8 10 12 14 178 190 24  
Odd numbers are:  
1 3 5 7 9 11 13 15 161 175
```

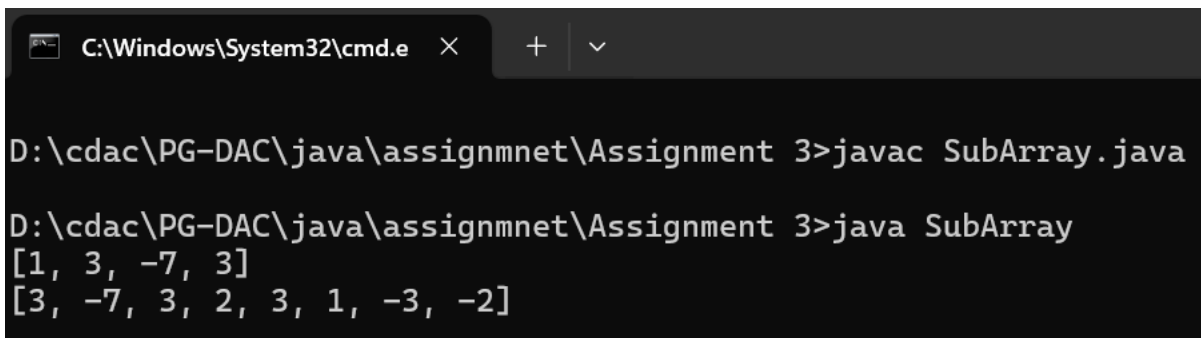


```

        {
            System.out.print(a[i]);
            if (i < end)
            {
                System.out.print(", ");
            }
        }
        System.out.println("]");
    }
}
}
}
}
}

```

Output:



```

C:\Windows\System32\cmd.e
D:\cdac\PG-DAC\java\assignmnet\Assignment 3>javac SubArray.java
D:\cdac\PG-DAC\java\assignmnet\Assignment 3>java SubArray
[1, 3, -7, 3]
[3, -7, 3, 2, 3, 1, -3, -2]

```

16. Given two sorted arrays A and B of size p and q, write a Java program to merge elements of A with B by maintaining the sorted order i.e. fill A with first p smallest elements and fill B with remaining elements.

Example:

Input :

int[] A = { 1, 5, 6, 7, 8, 10 }

int[] B = { 2, 4, 9 }

Output:

Sorted Arrays:

A: [1, 2, 4, 5, 6, 7]

B: [8, 9, 10]

Ans:

Input:

```
class SorteManage{  
    public static void main(String args[]){  
        int a[]= {1,5,6,7,8,10};  
        int b[]= {2,4,9};  
        int c[]= new int[a.length+b.length];  
        System.out.println("Before merging and sorthing array: ");  
        System.out.println("Array A: ");  
        for(int i=0;i<a.length;i++)  
        {  
            System.out.print(a[i]+" ");  
        }  
        System.out.println();  
        System.out.println("Array B: ");  
        for(int i=0;i<b.length;i++)  
        {  
            System.out.print(b[i]+" ");  
        }  
        System.out.println();  
        for(int i=0;i<a.length;i++)  
        {  
            c[i]=a[i];  
        }  
        for (int i = 0; i < b.length; i++)  
        {  
            c[a.length + i] = b[i];  
        }  
    }  
}
```

```

    }

    for (int i = 0; i < c.length - 1; i++)
    {
    for (int j = 0; j < c.length - 1 - i; j++)
        {
        if (c[j] > c[j + 1])
            {
            int temp = c[j];
            c[j] = c[j + 1];
            c[j + 1] = temp;
            }
        }
    }

    for(int i=0;i<a.length;i++)
    {
        a[i]=c[i];
    }
    for(int i=0;i<b.length;i++)
    {
        b[i]=c[a.length+i];
    }

    System.out.println("Arrays after sorting:");
    System.out.println("Array A: ");
    for(int i=0;i<a.length;i++)
    {
        System.out.print(a[i]+" ");
    }

    System.out.println();

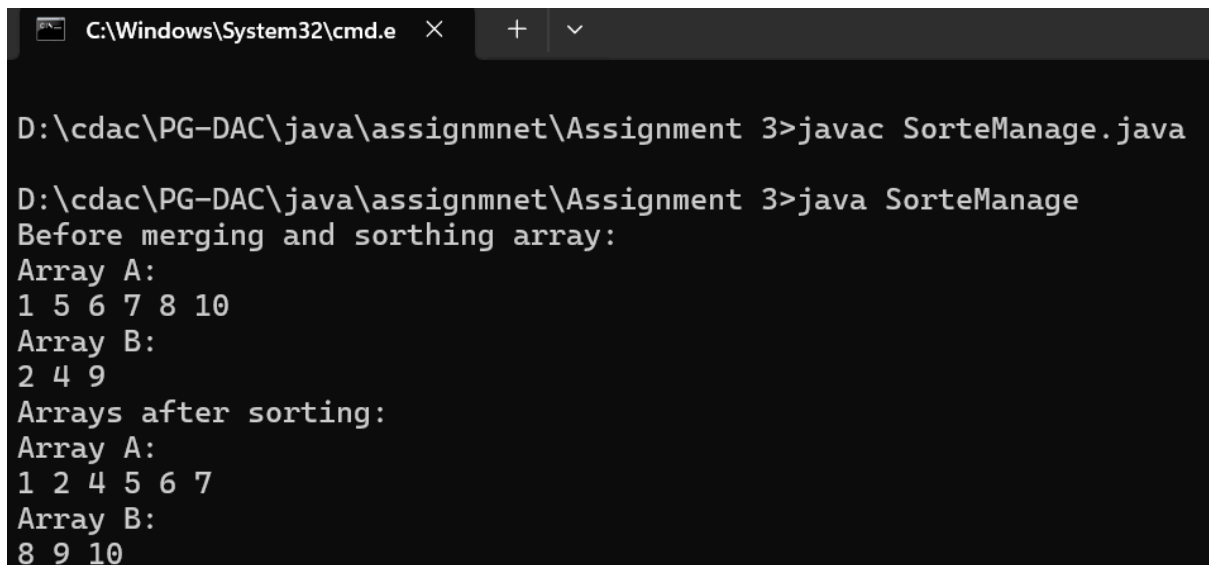
```

```

        System.out.println("Array B: ");
        for(int i=0;i<b.length;i++)
        {
            System.out.print(b[i]+" ");
        }
    }
}

```

Output:



```

D:\cdac\PG-DAC\java\assignmnet\Assignment 3>javac SorteManage.java
D:\cdac\PG-DAC\java\assignmnet\Assignment 3>java SorteManage
Before merging and sorthing array:
Array A:
1 5 6 7 8 10
Array B:
2 4 9
Arrays after sorting:
Array A:
1 2 4 5 6 7
Array B:
8 9 10

```

17. Write a Java program to find the maximum product of two integers in a given array of integers.

Example:

Input :

nums = { 2, 3, 5, 7, -7, 5, 8, -5 }

Output:

Pair is (7, 8), Maximum Product: 56

Ans:

Input:

```

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

```

```

        int a[]= { 2, 3, 5, 7, -7, 5, 8, -5 };
        int max=0;
        int max2=0;
        for (int i = 0; i < a.length; i++) {
            if (a[i] > max) {
                max2 = max;
                max = a[i];
            } else if (a[i] > max2 && a[i] < max) {
                max2 = a[i];
            }
        }

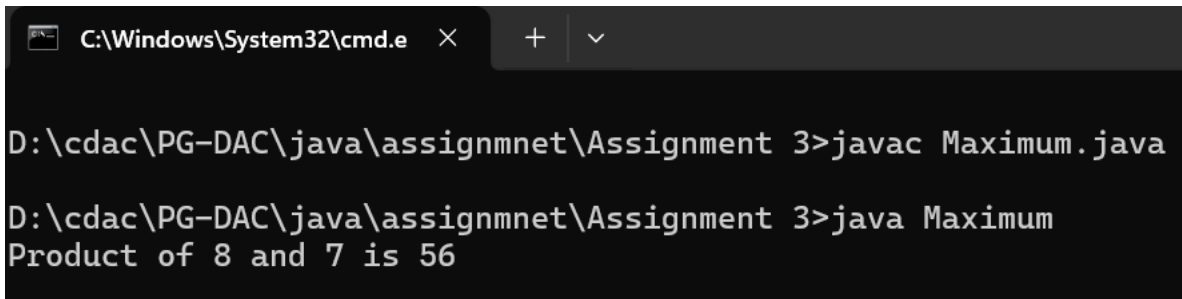
        int MaxProduct=max*max2;

        System.out.println("Product of "+max+" and "+max2+" is "+ MaxProduct);

    }
}

```

Output:



```

C:\Windows\System32\cmd.e  X  +  v
D:\cdac\PG-DAC\java\assignmnet\Assignment 3>javac Maximum.java
D:\cdac\PG-DAC\java\assignmnet\Assignment 3>java Maximum
Product of 8 and 7 is 56

```

18. Print a Matrix

- Given an m x n matrix, print all its elements row-wise.

Ans:

Input:

```

import java.util.Scanner;

class matrix{

    public static void main(String args[]){

```

```

int a[][]= new int[3][3];
Scanner input= new Scanner(System.in);
for(int i=0;i<3;i++)
{
    for(int j=0;j<3;j++)
    {
        System.out.print("Enter the number: ");
        a[i][j]= input.nextInt();
    }
    System.out.println();
}
System.out.println("Array:");
for(int ar[] : a)
{
    for(int x : ar)
    {
        System.out.print(" "+x);
    }
    System.out.println();
}
}

```

Output:

```
C:\Windows\System32\cmd.e  ×  +  v

D:\cdac\PG-DAC\java\assignmnet\Assignment 3>javac matrix.java

D:\cdac\PG-DAC\java\assignmnet\Assignment 3>java matrix
Enter the number: 1
Enter the number: 2
Enter the number: 3

Enter the number: 4
Enter the number: 5
Enter the number: 6

Enter the number: 7
Enter the number: 8
Enter the number: 9

Array:
1 2 3
4 5 6
7 8 9
```

19. Transpose of a Matrix

- Given a matrix, return its transpose (swap rows and columns).

Ans:

Input:

```
class Transpose{

    public static void main(String args[]){

        int a[][]={{11,12,13},{14,15,16},{17,18,19}};

        int at[][]= new int[3][3];

        System.out.println("Matrix A: ");

        for(int i=0;i<3;i++)

        {

            for(int j=0;j<3;j++)

            {

                System.out.print(a[i][j]+" ");
```



```

        }
        System.out.println();
    }
    System.out.println("Transpose of Matrix A: ");
    for(int i=0;i<3;i++)
    {
        for(int j=0;j<3;j++)
        {
            at[j][i]=a[i][j];
        }
    }
    for(int i=0;i<3;i++)
    {
        for(int j=0;j<3;j++)
        {
            System.out.print(at[i][j]+" ");
        }
        System.out.println();
    }
}

```

Output:

```
C:\Windows\System32\cmd.e  X  +  v

D:\cdac\PG-DAC\java\assignmnet\Assignment 3>javac Transpose.java

D:\cdac\PG-DAC\java\assignmnet\Assignment 3>java Transpose
Matrix A:
11 12 13
14 15 16
17 18 19
Transpost of Matrix A:
11 14 17
12 15 18
13 16 19
```

20. Sum of Two Matrices

- Given two matrices of the same size, compute their sum.

Ans:

Input:

```
class MatrixSum{

    public static void main(String args[]){

        int a[][]={{1,2,3},{4,5,6},{7,8,9}};

        int b[][]={{11,12,13},{14,15,16},{17,18,19}};

        int sum[][]= new int[3][3];

        for(int i=0;i<3;i++)

        {

            for(int j=0;j<3;j++)

            {

                sum[i][j]=a[i][j]+b[i][j];

            }

        }

        for(int i=0;i<3;i++)

        {

            for(int j=0;j<3;j++)

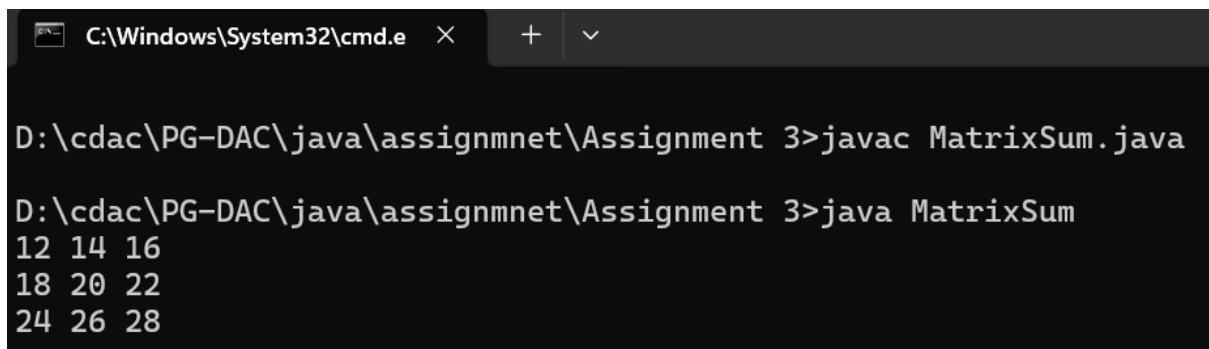
            {
```

```

        System.out.print(sum[i][j]+" ");
    }
    System.out.println();
}
}
}
}
}

```

Output:



```

C:\Windows\System32\cmd.e
D:\cdac\PG-DAC\java\assignmnet\Assignment 3>javac MatrixSum.java
D:\cdac\PG-DAC\java\assignmnet\Assignment 3>java MatrixSum
12 14 16
18 20 22
24 26 28

```

21. Row-wise and Column-wise Sum

- Find the sum of each row and each column of a given matrix.

Ans:

Input:

```

class RowColumn{
    public static void main(String args[]){
        int a[][]={{11,12,13},{14,15,16},{17,18,19}};
        int row[]=new int[a.length];
        int col[]=new int[a[0].length];
        for(int i=0;i<3;i++)
        {
            for(int j=0;j<3;j++)
            {
                row[i] += a[i][j];
                col[j] += a[i][j];
            }
        }
    }
}

```

```

        }
    }
    System.out.println("addition of rows is: ");
    for(int i=0;i<3;i++)
    {
        System.out.print(row[i]+" ");
    }
    System.out.println();
    System.out.println("addition of columns is: ");
    for(int i=0;i<3;i++)
    {
        System.out.print(col[i]+" ");
    }
}
}

```

Output:

```

C:\Windows\System32\cmd.e
D:\cdac\PG-DAC\java\assignmnet\Assignment 3>javac RowColumn.java
D:\cdac\PG-DAC\java\assignmnet\Assignment 3>java RowColumn
addition of rows is:
36 45 54
addition of columns is:
42 45 48

```

22. Find the Maximum Element in a Matrix

- Find the largest element in a given matrix.

Ans:

Input:

```

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

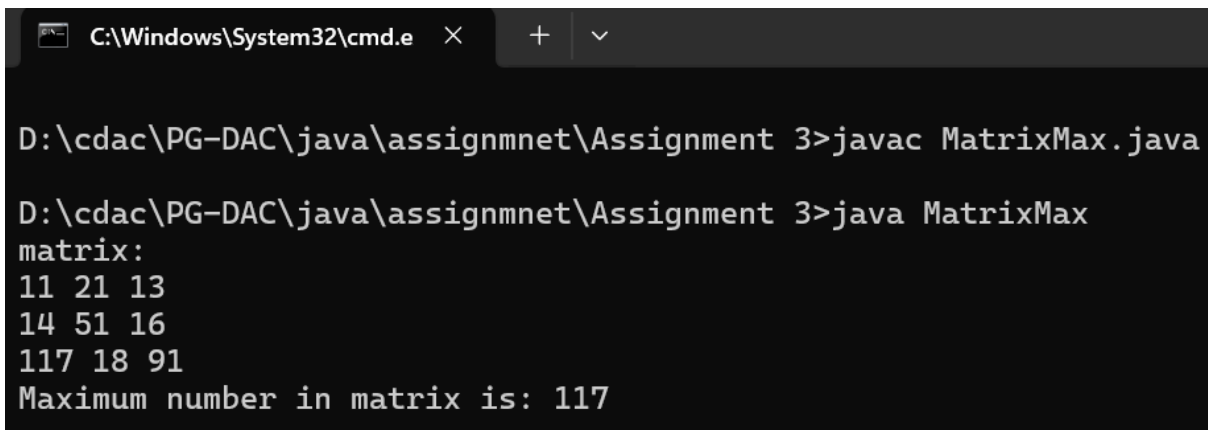
```

```

int a[][]={{11,21,13},{14,51,16},{117,18,91}};
int max=0;
System.out.println("matrix:");
for(int i=0;i<3;i++)
{
    for(int j=0;j<3;j++)
    {
        System.out.print(a[i][j]+" ");
        if((a[i][j])>max)
        {
            max=a[i][j];
        }
    }
    System.out.println();
}
System.out.println("Maximum number in matrix is: "+ max);
}
}

```

Output:



```

D:\cdac\PG-DAC\java\assignmnet\Assignment 3>javac MatrixMax.java

D:\cdac\PG-DAC\java\assignmnet\Assignment 3>java MatrixMax
matrix:
11 21 13
14 51 16
117 18 91
Maximum number in matrix is: 117

```

23. Matrix Multiplication

- Multiply two matrices and return the resultant matrix.

Ans:

Input:

```
class MatrixMultiplication{  
    public static void main(String args[]){  
        int a[][]={{1,2,3},{4,5,6},{7,8,9}};  
        int b[][]={{11,12,13},{14,15,16},{17,18,19}};  
        int mult[][]= new int[3][3];  
        for(int i=0;i<3;i++)  
        {  
            for(int j=0;j<3;j++)  
            {  
                mult[i][j]=a[i][j]*b[i][j];  
            }  
        }  
        System.out.println("Multiplication of two matrix is: ");  
        for(int i=0;i<3;i++)  
        {  
            for(int j=0;j<3;j++)  
            {  
                System.out.print(mult[i][j]+" ");  
            }  
            System.out.println();  
        }  
    }  
}
```

Output:

```
C:\Windows\System32\cmd.e  ×  +  v

D:\cdac\PG-DAC\java\assignmnet\Assignment 3>javac MatrixMultiplication.java

D:\cdac\PG-DAC\java\assignmnet\Assignment 3>java MatrixMultiplication
Multiplication of two matrix is:
11 24 39
56 75 96
119 144 171
```

24. Rotate a Matrix by 90 Degrees

- Rotate a given N x N matrix by 90 degrees clockwise.

Ans:

Input:

```
class MatrixRotate{

    public static void main(String args[]){

        int a[][]={{11,12,13},{14,15,16},{17,18,19}};

        int r[][]= new int[3][3];

        System.out.println("Matrix A: ");

        for(int i=0;i<3;i++)

        {

            for(int j=0;j<3;j++)

            {

                System.out.print(a[i][j]+" ");

            }

            System.out.println();

        }

        System.out.println("Rotating 90o of Matrix A: ");

        for(int i=0;i<3;i++)

        {

            for(int j=0;j<3;j++)

            {

                r[j][2-i]=a[i][j];

            }

        }

    }

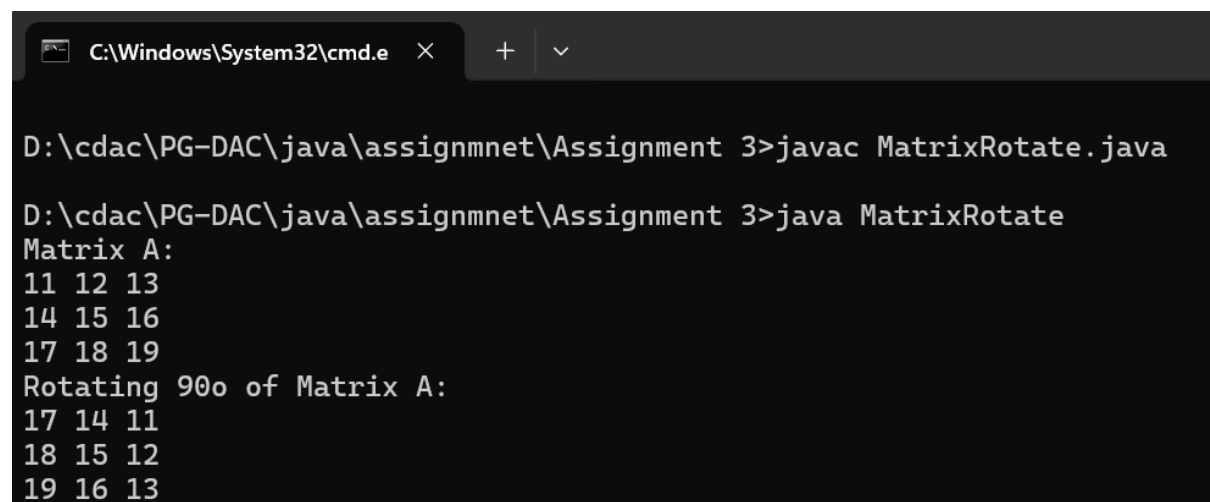
}
```

```

        }
    }
    for(int i=0;i<3;i++)
    {
        for(int j=0;j<3;j++)
        {
            System.out.print(r[i][j]+" ");
        }
        System.out.println();
    }
}
}

```

Output:



```

C:\Windows\System32\cmd.e
D:\cdac\PG-DAC\java\assignmnet\Assignment 3>javac MatrixRotate.java
D:\cdac\PG-DAC\java\assignmnet\Assignment 3>java MatrixRotate
Matrix A:
11 12 13
14 15 16
17 18 19
Rotating 90o of Matrix A:
17 14 11
18 15 12
19 16 13

```

25. Find the Diagonal Sum

- Compute the sum of both diagonals in a square matrix.

Ans:

Input:

```

class MatrixDiagonal{
    public static void main(String args[]){
        int a[][]={{11,12,13},{14,15,16},{17,18,19}};
    }
}

```



```

int d=0;

System.out.println("Matrix A: ");

for(int i=0;i<3;i++)
{
    for(int j=0;j<3;j++)
    {
        System.out.print(a[i][j]+" ");
    }
    System.out.println();
}

for(int i=0;i<3;i++)
{
    for(int j=0;j<3;j++)
    {
        if(i==j || i==0 && j==2 || i==2 && j==0)
        {
            d+=a[i][j];
        }
    }
}

System.out.println("Sum of digonal of Matrix A: "+d);
}
}

```

Output:



C:\Windows\System32\cmd.e



```
D:\cdac\PG-DAC\java\assignmnet\Assignment 3>javac MatrixDiagonal.java
```

```
D:\cdac\PG-DAC\java\assignmnet\Assignment 3>java MatrixDiagonal
```

```
Matrix A:
```

```
11 12 13
```

```
14 15 16
```

```
17 18 19
```

```
Sum of digonal of Matrix A: 75
```