**Finding Maximum and Minimum**

1. Write a Program to find both the maximum and minimum values in the array. Implement using any programming language of your choice. Execute your code and provide the maximum and minimum values found.

Input : N= 8, a[] = {5,7,3,4,9,12,6,2}

Output : Min = 2, Max = 12

Test Cases :

Input : N= 9, a[] = {1,3,5,7,9,11,13,15,17}

Output : Min = 1, Max = 17

Test Cases :

Input : N= 10, a[] = {22,34,35,36,43,67, 12,13,15,17}

Output : Min 12, Max 67

1. Consider an array of integers sorted in ascending order: 2,4,6,8,10,12,14,18.

Write a Program to find both the maximum and minimum values in the array. Implement using any programming language of your choice. Execute your code and provide the maximum and minimum values found.

Input : N=8, 2,4,6,8,10,12,14,18.

Output : Min = 2, Max =18

Test Cases :

Input : N= 9, a[] = {11,13,15,17,19,21,23,35,37}

Output : Min = 11, Max = 37

Test Cases :

Input : N= 10, a[] = {22,34,35,36,43,67, 12,13,15,17}

Output : Min 12, Max 67

**Merge Sort**

1. You are given an unsorted array 31,23,35,27,11,21,15,28. Write a program for Merge Sort and implement using any programming language of your choice.

Test Cases :

Input : N= 8, a[] = {31,23,35,27,11,21,15,28}

Output : 11,15,21,23,27,28,31,35

Test Cases :

Input : N= 10, a[] = {22,34,25,36,43,67, 52,13,65,17}

Output : 13,17,22,25,34,36,43,52,65,67

1. Implement the Merge Sort algorithm in a programming language of your choice and test it on the array 12,4,78,23,45,67,89,1. Modify your implementation to count the number of comparisons made during the sorting process. Print this count along with the sorted array.

Test Cases :

Input : N= 8, a[] = {12,4,78,23,45,67,89,1}

Output : 1,4,12,23,45,67,78,89

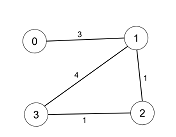
Test Cases :

Input : N= 7, a[] = {38,27,43,3,9,82,10}

Output : 3,9,10,27,38,43,82,

**All Pairs Shortest Paths: Floyd's Algorithm**

1. Implement Floyd's Algorithm to find the shortest path between all pairs of cities. Display the distance matrix before and after applying the algorithm. Identify and print the shortest path



Input: n = 4, edges = [[0,1,3],[1,2,1],[1,3,4],[2,3,1]], distanceThreshold = 4

Output: 3

Explanation: The figure above describes the graph.

The neighboring cities at a distanceThreshold = 4 for each city are:

City 0 -> [City 1, City 2]

City 1 -> [City 0, City 2, City 3]

City 2 -> [City 0, City 1, City 3]

City 3 -> [City 1, City 2]

Cities 0 and 3 have 2 neighboring cities at a distanceThreshold = 4, but we have to return city 3 since it has the greatest number.

**Test cases :**

1. You are given a small network of 4 cities connected by roads with the following distances:

City 1 to City 2: 3

City 1 to City 3: 8

City 1 to City 4: -4

City 2 to City 4: 1

City 2 to City 3: 4

City 3 to City 1: 2

City 4 to City 3: -5

City 4 to City 2: 6

Implement Floyd's Algorithm to find the shortest path between all pairs of cities. Display the distance matrix before and after applying the algorithm. Identify and print the shortest path from City 1 to City 3.

Input as above

Output : City 1 to City 3 = -9

1. Consider a network with 6 routers. The initial routing table is as follows:

Router A to Router B: 1

Router A to Router C: 5

Router B to Router C: 2

Router B to Router D: 1

Router C to Router E: 3

Router D to Router E: 1

Router D to Router F: 6

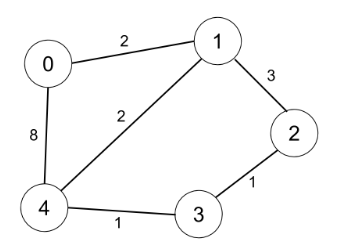
Router E to Router F: 2

Write a Program to implement Floyd's Algorithm to calculate the shortest paths between all pairs of routers. Simulate a change where the link between Router B and Router D fails. Update the distance matrix accordingly. Display the shortest path from Router A to Router F before and after the link failure.

Input as above

Output : Router A to Router F = 5

1. Implement Floyd's Algorithm to find the shortest path between all pairs of cities. Display the distance matrix before and after applying the algorithm. Identify and print the shortest path



Input: n = 5, edges = [[0,1,2],[0,4,8],[1,2,3],[1,4,2],[2,3,1],[3,4,1]], distanceThreshold = 2

Output: 0

Explanation: The figure above describes the graph.

The neighboring cities at a distanceThreshold = 2 for each city are:

City 0 -> [City 1]

City 1 -> [City 0, City 4]

City 2 -> [City 3, City 4]

City 3 -> [City 2, City 4]

City 4 -> [City 1, City 2, City 3]

The city 0 has 1 neighboring city at a distanceThreshold = 2.

1. Test cases :

B to A 2

A TO C 3

C TO D 1

D TO A 6

C TO B 7

Find shortest path from C to A

Output = 7

1. Find shortest path from E to C

C TO A 2

A TO B 4

B TO C 1

B TO E 6

E TO A 1

A TO D 5

D TO E 2

E TO D 4

D TO C 1

C TO D 3

Output : E to C = 5