① Given an array of [4, -2, 5, 3, 10, -5, 2, 8, -3, 6, 7, -4, 1, 9, -1, 0, -6, 8, 11, 9] integers. Find the maximum and minimum Product that can be obtained by multiply two integers From the array.

Sol:- array is [4, -2, 5, 3, 10, -5, 2, 8, -3, 6, 7, -4, 1, 9, -1, 0, -6, 11, 4]

we need to consider the target and Smallest product that can be Formed by selecting two consider From the array.

1) Sort the array.

Sorted array

[-9, -8, -6, -5, -4, -3, -2, -1, 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11]

Identify the possible candidates For maximum product

Identify the possible candidates For minimum product

calculating maximum product:-

⇒ The two longest positive numbers and 10×11=110.

⇒ The two Smallest negative numbers are -9 and -8=72

The maximum product is 0.

calculating minimum product:-

The largest positive and negative number 11 and -9.

11×-9=-99.

The Smallest positive and negative numbers are -9×8=-72

-99 is Smaller than -72

maximum product =110. and minimum product = -99

(2) Demonstrate the priority search method to search For the key = 23 From the array = {2,5,8,12,16,25,38,56,72,91}

Sol) Given array = {2,5,8,12,16,23,38,56,72,91}

1. Intalize pointers

low = 0 and high = 9

calculate mid = $\left[\frac{low+high}{2}\right] = \frac{0+9}{2} = 4$.

Compare arr[mid] with key:

arr[4] = 16

Since 16 < 23 update low = mid+1 = 5

calculate mid = $\left[\frac{low+high}{2}\right] = \frac{5+9}{2} = 7$

Compare arr[mid] with key:

arr[7] = 56

Since 56 > 23 update high = mid-1 = 6.

mid = $\left[\frac{5+6}{2}\right] = 5$

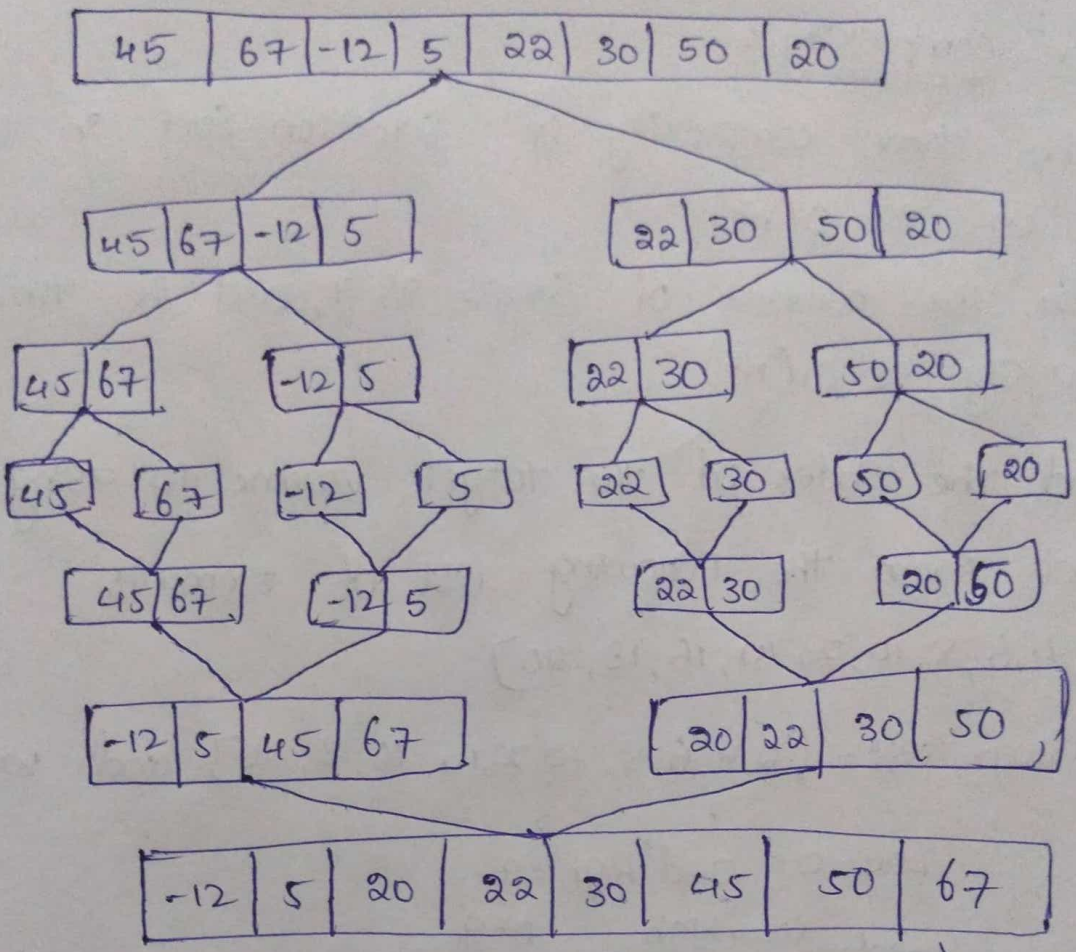
arr[mid] = arr[5] = 23

23 == 23 The is Faund at index 5

∴ The key = 23 is Faund at index 5.

(3) Apply merge sort and other list of 8 elements, data d = {4,5,6,7,-12,5,22,30,50,20}. Setup a recursive relation For the number of key comparision made by merge sort.

Sol:- merge sort



∴ The Sorted list = (-12, 5, 20, 22, 30, 45, 50, 67)

(4) Find the no.of times to perform solving Swapping For Selection Sort also estimate the time complexity For the other of notation set S(12,7,5,-2,18,6,13,4)

Sol) The selection sort algorithm always makes exactly n-1 swaps in the worst case, where n is the no.of elements in the list

given S = {12, 7, 5, -2, 18, 6, 13, 4}

No.of elements, n = 8

No. of Swaps $n=8$, $n-1=7$

Time complexity :-

The time complexity of Selection Sort in Big-O notation is $O(n^2)$

So, the numbers of Swaps is 7, and the time complexity is $O(n^2)$

(5) Find the index of the target value 10 using binary search From the Following list of elements

[2, 4, 6, 8, 10, 2, 14, 16, 18, 20]

Sol) Given list = [2, 4, 6, 8, 10, 2, 14, 16, 8, 20] and value = 10

Low = 0 and high = 9

$$mid = \frac{low + high}{2} = \frac{0+9}{2} = 4$$

Ex :- List(4), mid = 10 mid == value

Since 10 == 10 the target is Found at index 4.

∴ The Target value = 10 is Found at index 4.