Homework Questions of 22nd February 2023

Q1 In case of search in rotated & sorted array while finding the pivot element, can we compare the mid element with the end element & then decide where to search ? If yes, then write its code.

0	1	2	3	4	5	6
3	4	5	6	7	1	2
↑						↑
s						e

$$mid = \frac{s+e}{2} = \frac{0+6}{2} = 3$$

arr [mid] = 6

arr [mid] >= arr [e]

6 >= 2 } True, hence we have to search in right, keeping in mind that 6 can also be a possible answer.

So s = mid ; is done when the above condition is true.

If the above condition does not hold good, then just search in left part i.e e = mid - 1.

Step-1 6 >= 2

s = mid ⇒ s = 3

0	1	2	3	4	5	6
3	4	5	6	7	1	2
			↑			↑
			s			e

Step-2

$$mid = \frac{3+6}{2} = 4$$

arr [mid] = 7

↱ arr[mid] > arr[mid+1] ∆
hence return mid i.e 4th index.

7 >= 2 } True, then search in the right array by doing s = mid

3	4	5	6	7	1	2
				↑ s	↑ m	↑ e

Step-3 (Extra step)

$mid = \frac{4+6}{2} = 5$

arr[mid] > arr[mid+1] ⇉ False

arr[mid-1] > arr[mid] ⇉ True & hence return mid-1 i.e 4th index & hence the pivot element is 7.

Code

```
int pivotElement (vector <int> arr){

    int s = 0;
    int e = arr.size() - 1;
    int mid = s + (e-s)/2;

while (s < e) {

  if (mid+1 < arr.size() && arr[mid] > arr[mid+
  {
     return mid;

  }
if (mid-1 >= 0 && arr[mid-1] > arr[mid]){
    return mid-1;
}
```

```
    if (arr[mid] >= arr[e])
                s = mid;
    else
                e = mid - 1;
    mid = s + (e-s)/2;
}
return s;
}
```