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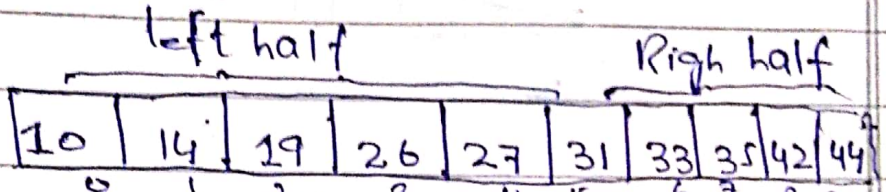
SUBJECT :- Data structure & Algorithm.

Mid-Summer 2020

Q1

Ans



First we shall determine half of the array by using this formula

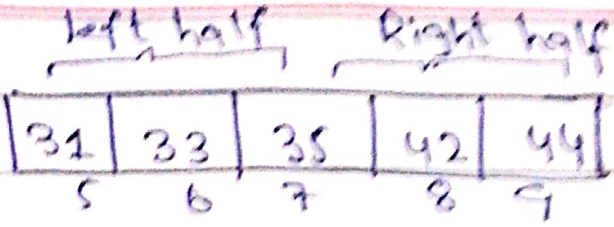
mid = low + (high - low)/2

= 0 + (9 - 2)/2

= 7/2

= 4.5 ⇒ 4

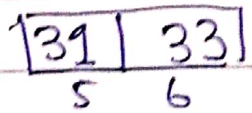
The value of location 4 is 27. which is not match As the value is greater than 27 & we have sorted array. so we also know that the target value must be in the upper portion of the array.



mid = low + high / 2.
= 5 + 9 / 2
= 14 / 2 = 7

The value on location 7 is 35. It is more than what we are looking for. So, the value must be in the lower part from this location.

Hence we calculate the mid - again



mid = low + high / 2. = 5 + 6 / 2 = 11 / 2

= 5.5 => 5

We compare the value stored at location 5 with our target. We find that it is match. Binary search reduce the value to very less numbers.

Q2

Ans- Below is the implementation of the above algorithm

```
# include <stdio.h>
main () {
   int LA[] = {1, 3, 5, 7, 8};
   int item = 10, k = 3, n = 5;
   int i = 0, j = n;

Printf("The original array elements are-
                :\n");
for (i = 0; i<n; i++) {
    Printf("LA[%d] = %d \n", i, LA[i]);
}
   n = n+1;
While (j >= k) {
   LA[j+1] = LA[j];
      j = j
}
LA[k] = item;
```

```
Printf("The array elements -
    after insertion :\n");
for (i=0; i<n; i++){
  Printf("LA[%d]= %d \n", i,
          LA[i]);
  }
}
```

Results:

The orginal array elements are:

LA[0] = 1
LA[1] = 3
LA[2] = 5
LA[3] = 7
LA = [4] = 8

The array elements after insertion.

LA[0] = 1
LA[1] = 3
LA[2] = 5
LA[3] = 10
LA[4] = 7
LA[5] = 8.

Q3

Ans LINEAR SEARCH ALGORITHM

(1) Take Input array from user.
(2) Take element you want to search from user
(3) start from 1st element in array to last
(4) IF match found
then → Print message
stop process.
else
move to next element in array
(5) END

* [redacted] C++

```
# include <iostream>
using namespace std;
void linear search (int a[ ], int n)
{
    int temp = -1;
for (int i=0; i<7; i++)
{
    Cout << " Element found at location:
```

```
" << i << endl;
    temp = 0;
   }
 }
  if (temp == -1)
  {
    cout << " No Element Found" << endl;
   }
}

  int main( )
  {
    int arr[7] = { 18, 36, 56, 61, 73, 87, 93};

cout << " Please enter an element to search" << endl;
Int num;
 cin >> num;
 linear search(arr, num);
  return 0;
 }
```