Searching

Linear Search

```
LINEAR_SEARCH(A, N, VAL, POS)

Step 1: [INITIALIZE] SET POS = -1
Step 2: [INITIALIZE] SET I = 0
Step 3:   Repeat Step 4 while I<N
Step 4:         IF A[I] = VAL, then
                     SET POS = I
                     PRINT POS
                     Go to Step 6
           [END OF IF]
     [END OF LOOP]
Step 5: PRINT "Value Not Present In The Array"
Step 6: EXIT
```

Binary Search

BEG = lower_bound and END = upper_bound

MID = (BEG + END) / 2

If VAL < A[MID], then VAL will be present in the left segment of the array.

So,

the value of END will be changed as, END = MID – 1

If VAL > A[MID], then VAL will be present in the right segment of the array. So,

the value of BEG will be changed as, BEG = MID + 1

Binary Search

```
BINARY_SEARCH(A, lower_bound, upper_bound, VAL, POS)

Step 1: [INITIALIZE] SET BEG = lower_bound, END = upper_bound, POS = -1
Step 2: Repeat Step 3 and Step 4 while BEG <= END
Step 3:         SET MID = (BEG + END)/2
Step 4:         IF A[MID] = VAL, then
                      POS = MID
                      PRINT POS
                      Go to Step 6
                IF A[MID] > VAL then;
                      SET END = MID - 1
                ELSE
                      SET BEG = MID + 1
                [END OF IF]
     [END OF LOOP]
Step 5: IF POS = -1, then
           PRINTF "VAL IS NOT PRESENT IN THE ARRAY"
     [END OF IF]
Step 6: EXIT
```

Binary Search

int A[] = {0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10};
and VAL = 9, the algorithm will proceed in the following manner.
BEG = 0, END = 10, MID = (0 + 10)/2 = 5
Now, VAL = 9 and A[MID] = A[5] = 5
A[5] is less than VAL, therefore, we will now search for the value in the later half of the array. So, we change the values of BEG and MID.
Now, BEG = MID + 1 = 6, END = 10, MID = (6 + 10)/2 =16/2 = 8
Now, VAL = 9 and A[MID] = A[8] = 8
A[8] is less than VAL, therefore, we will now search for the value in the later half of the array. So, again we change the values of BEG and MID.
Now, BEG = MID + 1 = 9, END = 10, MID = (9 + 10)/2 = 9
Now VAL = 9 and A[MID] = 9.
Now VAL = 9 and A[MID] = 9.