

## Answer on Question # 44894, Programming, Other

### Task:

1. Describe a recursive algorithm for finding the maximum element in an array A of n elements. What is the running time of your algorithm?

### Answer:

Algorithm Max (A, m, n)

if  $A[n-1] > m$

$m \leftarrow A[n-1]$

if  $n=1$

    return m

else

    return Max(A, m, n-1)

### Task:

2. Draw the recursion trace for the execution of ReverseArray(data, 0, 4), on the array data = 4, 3, 6, 2, 6.

### Answer:

Algorithm ReverseArray(A, i, j):

    Input: An array A and nonnegative integer indices i and j

    Output: The reversal of the elements in A starting at index i and ending at j

if  $i < j$  then

    Swap A[i] and A[j]

    ReverseArray(A, i+1, j-1)

return

1)  $i=0, j=4, A = \{4, 3, 6, 2, 6\}$

$i < j \rightarrow 0 < 4$  (yes)

swap(A[0], A[4])

$A = \{6, 3, 6, 2, 4\}$

2)  $i=1, j=3, A = \{6, 3, 6, 2, 4\}$

$i < j \rightarrow 1 < 3$  (yes)

swap(A[1], A[3])

$A = \{6, 2, 6, 3, 4\}$

3)  $i=2, j=2, A = \{6, 2, 6, 3, 4\}$

$i < j \rightarrow 2 < 2$  (no)

return

**Task:**

3. Give an algorithm for finding the second-to-last node in a singly-linked list which the last node is indicated by a null next reference.

**Answer:**

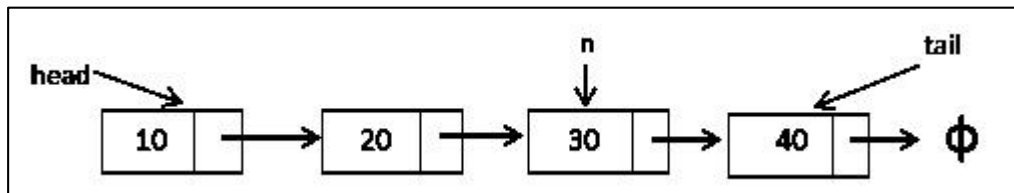
Algorithm findPenultimate(S):

Node  $n \leftarrow \text{head}$

while ( $n.\text{getNext()} \neq \text{tail}$ ) do

$N \leftarrow n.\text{getNext}()$

return  $n$

**Task:**

4. Suppose we are maintaining a collection C of elements such that, each time we add a new element to the collection, we copy the contents of C into a new array list of just the right size. What is the running time of adding  $n$  elements to an initially empty collection C in this case?

**Answer:**

The total running time for adding  $n$  elements in this way is  $O(n^2)$