Graphical user interface, text, application, email

Description automatically generated

Answers:

a.F

b.T

c.T

d.F

Graphical user interface, text

Description automatically generated

Answers:

A hand holding a piece of paper

Description automatically generated with low confidence

Text, letter

Description automatically generated

3. Consider sorting n numbers stored in array A by first finding the smallest element of A and exchanging

it with the element in A[1]. Then find the second smallest element of A, and exchange it with A[2].

Continue in this manner for the first n−1 elements of A.

a) Write pseudocode for this algorithm, which is known as selection sort.

b) What loop invariant does this algorithm maintain?

c) Why does it need to run for only the first n−1 elements, rather than for all n elements?

d) Give the best-case and worst-case running times of selection sort in Θ-notation.

a)

procedure Selection\_sort(A):

n = length (A)

for j = 1 to n -1:

smallestVlue = j

for I = j + 1 to n:

if A[i] < A[smallestValue]:

smallestValue = i

swap A[j] with A[smallestValue]

b)

in each outer for loop, the A[1,,,,j-1]consists of the smallest j-1 elements in array[1,…,n]

c)

after n-1 elements, the A[1….n-1] have the smallest n-1 elements in the sorted order,

therefore, the A[n], should be the biggest value.

d)

the overall running time in the big O notation would be O(n^2) in both best-case and worst -case.

Diagram

Description automatically generated with low confidence

Answers:

Qa:

Move disk 1 from source 1 to destination 2

Move disk 2 from source 1 to destination 3

Move disk 1 from source 2 to destination 3

Move disk 3 from source 1 to destination 2

Move disk 1 from source 3 to destination 1

Move disk 2 from source 3 to destination 2

Move disk 1 from source 1 to destination 2

Move disk 4 from source 1 to destination 3

Move disk 1 from source 2 to destination 3

Move disk 2 from source 2 to destination 1

Move disk 1 from source 3 to destination 1

Move disk 3 from source 2 to destination 3

Move disk 1 from source 1 to destination 2

Move disk 2 from source 1 to destination 3

Move disk 1 from source 2 to destination 3

Qb

Minimum of Move(5,1,3) is 31 and the Move(n,1,3) is 2^n-1

Alogirhtm:

def move(n, start, end):

Middle = 6 – start – end

If n == 1:

Print(start, end

Else:

Move(n-1, start, middle)

Move(1, start, end)

Move(n-1, middle, end)