Assignment III DSAL3001 March 2022

Student ID: 81788 Student Name: Akhil Montrose

Instructions: Answer all questions.

1. Consider the following function:

```
void   DoThis (A, m, n)
//input : Array A(m .. n)

      x ← A[m]; i ← m; j ←n;

      while A[i] ≤ x and i ≤ n do i ← i +1;
      while A[j] > x and j ≥ m do j ← j -1;
      if i< j then
          swap A[i] ↔ A[j];
      return A;
```

a. What task does this function perform?
Explain what the function does in general terms, not line by line.

It is a quicksort algorithm. It divides an array by selecting a pivot and then puts the pivot in it's correct position (numbers larger than the pivot goes to the right while numbers smaller than the pivot goes to the left.

b. i. What is the time complexity of the function?

The time complexity of the function is O(nlogn).

ii. If A[m .. n] = [27, 31, 07, 45, 16, 21, 30, 65, 53], what is the output?

Use 27 as pivot
[27, 31, 7, 45, 16, 21, 30, 65, 53]
[27, 21, 7, 45, 16, 31, 30, 65, 53]
[27, 21, 7, 16, 45, 31, 30, 65, 53]
[16, 21, 7, 27, 45, 31, 30, 65, 53]

Output: [16, 21, 7, 27, 45, 31, 30, 65, 53]
(All the numbers smaller than 27 is to the left and all the numbers larger than 27 are to the right)

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2. i. Represent the undirected graph below in a matrix form.

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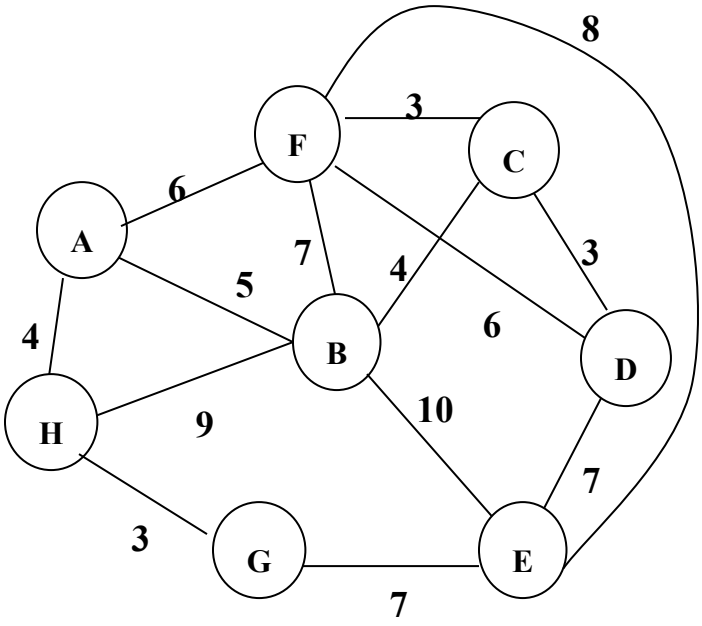

	A	B	C	D	E	F	G	H
A	-	5	-	-	-	6	-	4
B	5	-	4	-	10	7	-	9
C	-	4	-	3		-	-	-
D	-	-	3	-	7	6	-	-
E	-	10	-	7	-	-	7	-
F	6	7	3	6	-	-	-	-
G	-	-	-	-	7	-	-	3
H	4	9	-	-	-	-	3	-

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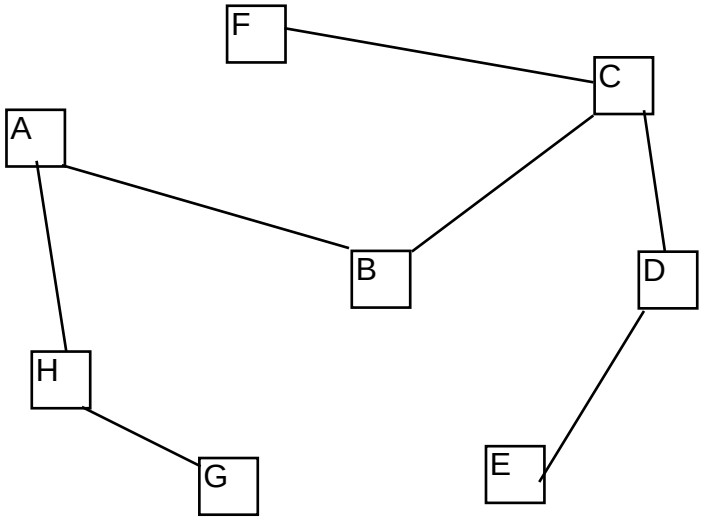
ii. Apply Kruskal's algorithm to find a minimum spanning tree for the graph.



Edge	Weight	Cycle
C,D	3	NO
C,F	3	NO
G,H	3	NO
A,H	4	NO
B,C	4	NO
A,B	5	NO
A,F	6	YES
D,F	6	YES
B,F	7	YES
D,E	7	NO
E,G	7	
E,F	8	
B,H	9	
B,E	10	