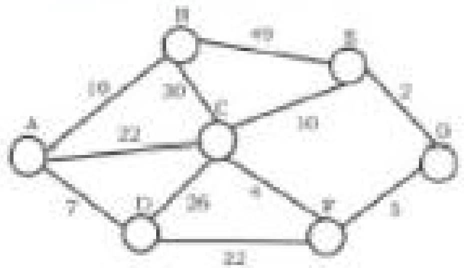
Consider the undirected graph below:



Using Prim's algorithm to construct a minimum spanning tree starting with node A, which one of the following sequences of edges represents a possible order in which the edges would be added to construct the minimum spanning tree?

(a) (E, G), (C, F), (F, G), (A, D), (A, B), (A, C)

(b) (A, D), (A, B), (A, C), (C, F), (G, E), (F, G)

(c) (A, B), (A, D), (D, F), (F, G), (G, E), (F, C)

(d) (A, D), (A, B), (D, F), (F, C), (F, G), (G, E)

- [ ] a.
- [ ] b.
- [ ] c.
- [x] d.

When a top-down approach of dynamic programming is applied to a problem, it usually

1 point

- ○ Decreases both, the time complexity and the space complexity
- ○ Increases the time complexity and decreases the space complexity
- ○ Increases both, the time complexity and the space complexity
- ◉ Decreases the time complexity and increases the space complexity

Clear selection

What is the time complexity of the recursive implementation used to find the nth Fibonacci term? *

- [ ] O(nxn)
- [x] Exponential
- [ ] O(n!)
- [ ] O(1)

Fractional knapsack problem is solved most efficiently by which of the following algorithm? * 1 point

- ◯ Divide and conquer
- ◯ Dynamic programming
- ◉ Greedy algorithm
- ◯ Backtracking

What is the number of edges present in a complete graph having m vertices and n edges? * 1/1

- ○ n(n-1)
- ○ n(n+1)/2
- ○ m(m+1)/2
- ◉ m(m-1)/2

Consider the following functions

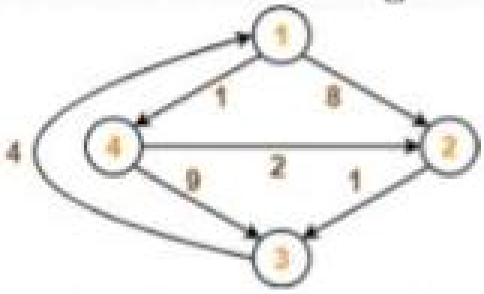
$$f(n) = 3n^{\sqrt{n}}$$
$$g(n) = 2^{\sqrt{n}\log_2 n}$$
$$h(n) = n!$$

Which of the following is true?

(a) $h(n)$ is $\mathcal{O}(f(n))$
(b) $h(n)$ is $\mathcal{O}(g(n))$
(c) $g(n) \neq \mathcal{O}(f(n))$
(d) $f(n)$ is $\mathcal{O}(g(n))$

- ○ a
- ◉ b
- ○ c
- ○ d

Conssider the following directed graph



Using Floyd Warshall Algorithm and find which of following matrix represents the shortest path distance between every pair of vertices.

(a) $\begin{bmatrix} 0 & 3 & 4 & 1 \\ 5 & 0 & 1 & 6 \\ 4 & 7 & 0 & 5 \\ 7 & 2 & 3 & 0 \end{bmatrix}$

(b) $\begin{bmatrix} 0 & 3 & -9 & 1 \\ 5 & 0 & 4 & 6 \\ 4 & 7 & 0 & 5 \\ 7 & 2 & 3 & 1 \end{bmatrix}$

(c) $\begin{bmatrix} 0 & 3 & 9 & 1 \\ 5 & 0 & 4 & 6 \\ 2 & 3 & 1 & 5 \\ 7 & 2 & 3 & 0 \end{bmatrix}$

(d) $\begin{bmatrix} 1 & 3 & -4 & 1 \\ 5 & 0 & 4 & 6 \\ 4 & 7 & 0 & 5 \\ 7 & 2 & 3 & 0 \end{bmatrix}$

a.

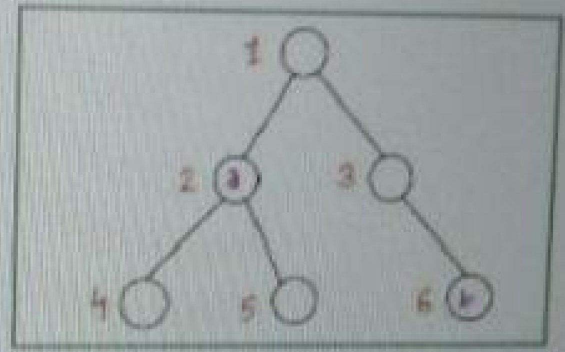
Max heap is built using the numbers (12, 1, 4, 8, 6, 13, 9, 3). Assuming the first position number to be 1, what will be the new position numbers of 12 and 6 respectively, after the max heap is built?

(a) 3, 5

(b) 3, 4

(c) 3, 6

(d) 2, 6



Here the position numbers of a and b are 2 and 6 respectively.

- a.
- b.
- c.
- d.

Clear selection

1 point

While sorting the numbers $(70, 48, 76, 58, 43, 47, 78, 53)$ using quicksort, the last number is chosen as pivot, what will be the permutation of the numbers after partition function has been applied?

(a) 48 43 47 53 70 76 78 58

(b) 43 47 48 53 58 70 76 78

(c) 48 47 43 53 70 78 76 58

(d) 47 48 43 53 78 76 70 58

- [x] a.
- [ ] b.
- [ ] c.
- [ ] d.

The best case behaviour occurs for quick sort is, if partition splits the array of size n into

(a) $n/2 : (n/2) - 1$

(b) $n/2 : n/3$

(c) $n/4 : 3n/2$

(d) $n/4 : 3n/4$

- (•) a
- ( ) b
- ( ) c
- ( ) d

Which of the following problems is NOT solved using dynamic programming? *

- ○ 0/1 knapsack problem
- ○ Matrix chain multiplication problem
- ○ Edit distance problem
- ◉ Fractional knapsack problem

*

1

Which of the following statements are true
Statement1: A subpath of a shortest path is a shortest path.
Statement2: If a graph G contains a negetive weight cycle, then some shortest path may not be exist.

(a) Statement 1 is true but 2 is false
(b) Statement 1 is false but 2 is true
(c) Both are true

- [ ] a.
- [x] b.
- [ ] c.

How do we know when to stop Prim's algorithm for finding the minimum spanning tree of a given graph?

(a) There is no stopping point, so the algorithm is continued indefinitely.

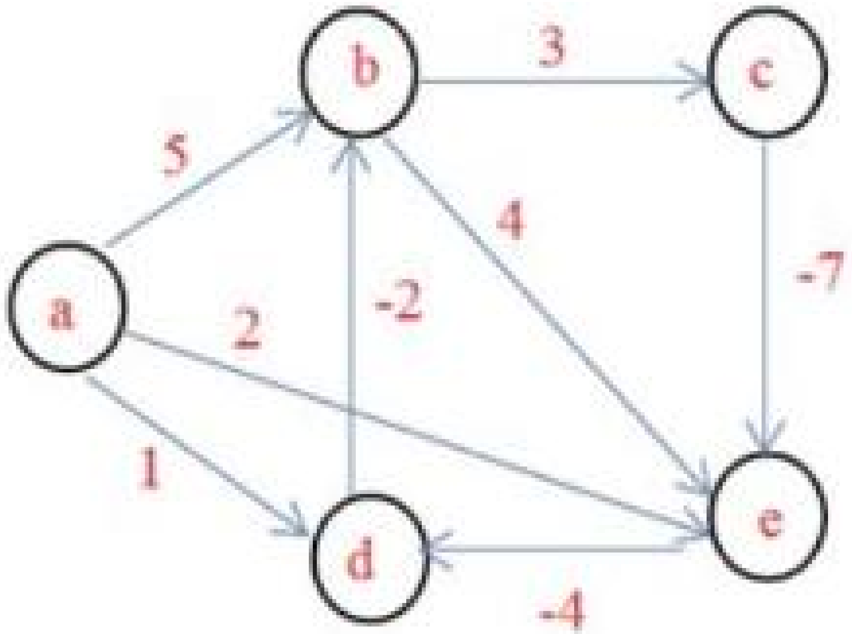
(b) When all of the vertices of the original graph are included in the tree

(c) When all of the edges of the original graph are included in the tree

(d) When half of the vertices of the original graph are included in the tree

- [ ] a.
- [x] b.
- [ ] c.
- [ ] d.

How many intermediate vertices are required to travel from node a to node e at a minimum cost? * 1 point



- 1
- 2
- 3
- 4

The worst-case running time of Prim's algorithm using a Fibonacci heap is * 1 p

- [x] O(E+V log V)
- [ ] O(V+E log E)
- [ ] O(V log E)
- [ ] O(E log E)