Minimum Spanning Trees

Reset Progress Reveal Solutions

1 Parts of Minimum Spanning Tree

For each of the following edges, determine whether it has to be necessarily part of some minimum spanning tree.

The minimum edge coming out of a vertex is

- (●) always part of some MST.
- ( ) not necessarily part of some MST.

Correct

An edge on the shortest path between two vertices is

- ( ) always part of some MST.
- (●) not necessarily part of some MST.

Correct

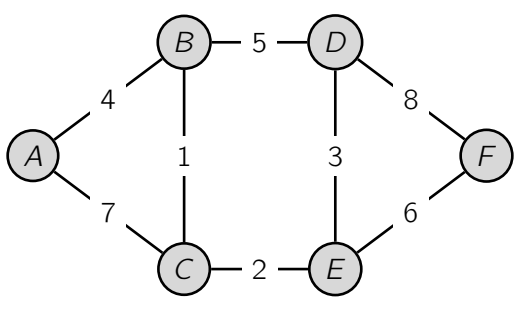
The smallest edge going across a cut is

- (●) always part of some MST.
- ( ) not necessarily part of some MST.

Correct

2 Minimum Spanning Tree Example

Consider the graph below:



What is the weight of the minimum spanning tree in this graph?

16

Correct

Assume we run Prim's algorithm on this graph to find the minimum spanning tree starting at vertex A.

What is the weight of the first edge added?

4

Correct

What is the weight of the second edge added?

1

Correct

What is the weight of the third edge added?

2

Correct

What is the weight of the fourth edge added?

3

Correct

What is the weight of the fifth edge added?

6

Correct

Assume we run the Kruskal's algorithm on this graph to find the minimum spanning tree.

What is the weight of the first edge added?

1

Correct

What is the weight of the second edge added?

2

Correct

What is the weight of the third edge added?

3

Correct

What is the weight of the fourth edge added?

4

Correct

What is the weight of the fifth edge added?

6

Correct

3 Maximum Spanning Tree

Can we find the maximum spanning tree (instead of minimum) using the same Kruskal or Prim algorithms?

- ( ) Yes, we can multiply the weights by -1 and run the minimum spanning tree algorithms.
- ( ) Yes, we can modify both algorithms by choosing the edge with the greatest weight each time (instead of the edge with the least weight).
- (●) Both of the above are correct.
- ( ) No, we can't.

Correct

Consider the graph from the previous problem. This time we want to find the maximum spanning tree.

What is the weight of the maximum spanning tree in the graph?

30

Correct

Assume that we run Prim's algorithm on this graph to find the maximum spanning tree starting at vertex A.

What is the weight of the first edge added?

7

Correct

What is the weight of the second edge added?

4

Correct

What is the weight of the third edge added?

5

Correct

What is the weight of the fourth edge added?

8

Correct

What is the weight of the fifth edge added?

6

Correct

Assume we run Kruskal's algorithm on this graph to find the maximum spanning tree.

What is the weight of the first edge added?

8

Correct

What is the weight of the second edge added?

7

Correct

What is the weight of the third edge added?

6

Correct

What is the weight of the fourth edge added?

5

Correct

What is the weight of the fifth edge added?

4

Correct