CSCE 221
Problem Set 18

Jacob Purcell, Texas A&M, Student

I.

A.

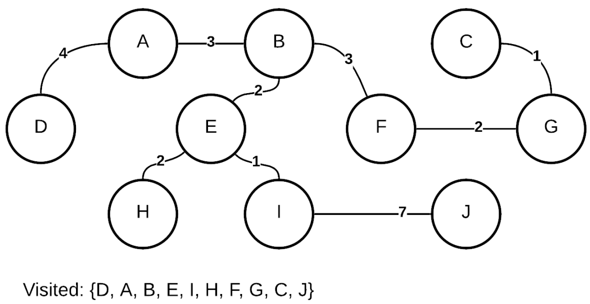

Fig. 1. Minimum spanning tree generated by Prim's Algorithm.

B.

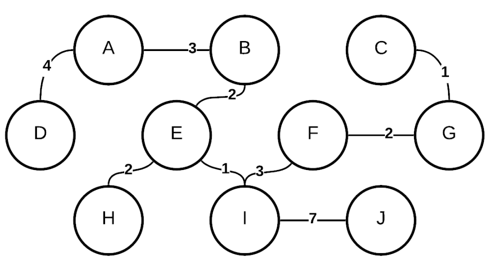

Fig. 2. Minimum spanning tree generated by Kruskal's Algorithm.

C.

These trees are not unique as there are arbitrary choices in both algorithms that may result in the same minimum spanning tree.

II.

Using Cayley's formula

$$n^{n-2}$$

where n is the number of vertices,

A.

$$1^{-1} = \boxed{1}$$

B.

$$2^0 = \boxed{1}$$

C.

$$3^1 = \boxed{3}$$

D.

$$4^2 = \boxed{16}$$

E.

The number of unrooted trees will be T. For any T, there are V possible root nodes,

$$TV$$

For any root node there are $(V-1)!$ edge configurations

$$TV(V-1)!$$

$$TV!$$

At the same time, if we add edges one by one to the nodes, we have $V(V-1)$ possible places, then $V(V-2)$ and so on, which yields the possible number of trees,

$$\Pi_{k=1}^{V} V(k-1) = V^{V-2} V!$$

$$TV! = V^{V-2} V!$$

$$T = \boxed{V^{V-2}}$$