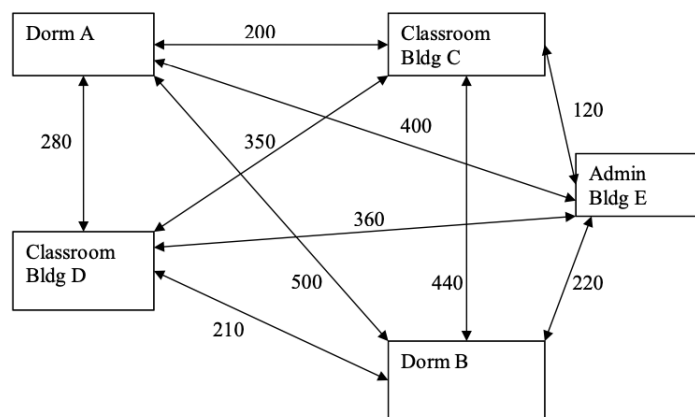


Section 1.4 Networks and Spanning Trees

During the first year on its new campus, Cold Region State College had several unfortunate cases of frostbite among students walking to class. To avoid this happening in the future, the administration intends to convert several of the existing walkways to protected walkways so that students can **go from any building on campus to another building** without being exposed to the inclement weather. To minimize expenses and the time of construction, they wish to draw up plans for the **minimum total length of walkways that need to be converted**. How can this be done? The campus map is shown below with each existing walkway shown. The distances are given in yards.

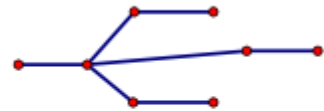
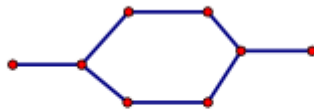
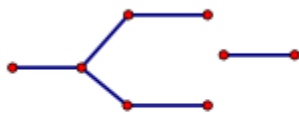


What are we asked to find? A circuit? A path? Or something else?

Network -

Tree -

Example 1. Are the following networks a tree? If not, why not?



Properties of Trees

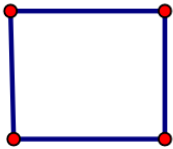
1. The Single-Path Property:
2. The All-Bridges Property:
3. The $N-1$ Edges Property:

Subtree

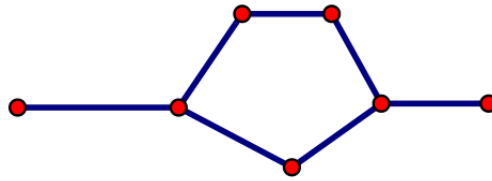
Spanning Tree

Example 2. Find all possible spanning trees of each graph.

1.

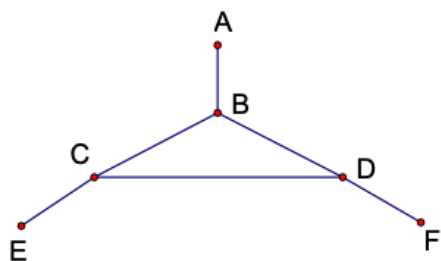


2.

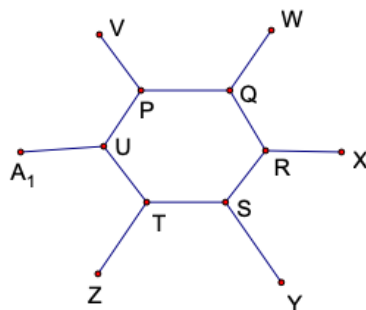


Example 3. Find how many spanning trees each graphs has (No need to draw them.)

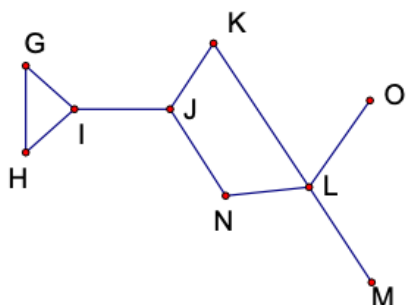
1.



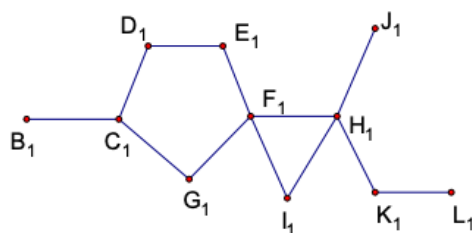
2.



3.



4.



5.

