

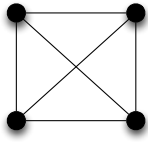
**CSE373 Winter 2014**  
**Example Questions on Minimum Spanning Trees**

1. (a) Draw a undirected graph with exactly 4 nodes that has exactly 0 minimum spanning trees.
- (b) Draw a undirected graph with exactly 4 nodes that has exactly 1 minimum spanning tree.
- (c) Draw a undirected graph with exactly 4 nodes that has exactly 3 minimum spanning trees.
- (d) Draw a undirected graph with exactly 4 nodes that has exactly 4 minimum spanning trees.
- (e) Draw a undirected graph with exactly 4 nodes that has exactly 8 minimum spanning trees.

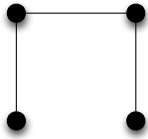
**Solution:**

- (a) Any unconnected undirected graph
- (b) Graph needs to have 3 non-self edges such that the graph is connected
- (c) Graph needs a complete 3-node graph (i.e. a triangle) and an edge connecting it with the fourth node (for a total of 4 edges)
- (d) Graph needs 4 non-self edges such that the graph does not contain a complete 3-node graph
- (e) Graph needs 5 non-self edges

2. Here is a picture of an undirected graph with 4 nodes that contains every non-self edge:



Here is a picture of just one possible spanning tree for this graph:



Draw fifteen more spanning trees for this same graph.

**Solution:**

