1. Draw all trees of order 5.

2. Prove that if every vertex of a graph $G$ has degree at least 2, then $G$ contains a cycle.

3. Let $T$ be a tree of order $n$ and size $m$ having $n_i$ vertices of degree $i$ for $i \geq 1$. Then $n = \sum n_i$ and $2(n - 1) = 2m = \sum in_i$. Prove that $n_i = 2 + n_3 + 2n_4 + 3n_5 + 4n_6 + \cdots$.

4. Apply both Kruskal’s and Prim’s Algorithms to find a minimum spanning tree in the weighted graph in Figure 1.

5. (a) Use the Matrix Tree Theorem to determine the number of spanning trees of the graph of Figure 2.

(b) Draw all spanning trees in the graph of Figure 2.

Figure 1. 

Figure 2.