Problem 1. Determine the truth of the following statements about weighted undirected graphs with $|V|$ nodes, $|E|$ edges, and positive edge weights.

A shortest path may contain $|E|$ edges. □ True □ False

If a graph is disconnected, then $|E| < |V| - 1$. □ True □ False

A graph may have exactly $|E|$ MSTs. □ True □ False

A shortest path tree may contain $|E|$ edges. □ True □ False

Problem 2. In Figure 1, complete the labeling of the vertices according to their distance.

Figure 1: The (unweighted, undirected) graph for Problem 2.
Problem 3. In Figure 2, complete the labeling of the vertices according to their distance.

![Figure 2: The (unweighted, undirected) graph for Problem 3.](image1)

Problem 4. In Figure 3, complete the labeling of the vertices according to their distance.

![Figure 3: The (weighted, undirected) graph for Problem 4.](image2)
Problem 5. In Figure 4, complete the labeling of the vertices according to their distance.

Figure 4: The (weighted, directed) graph for Problem 5.