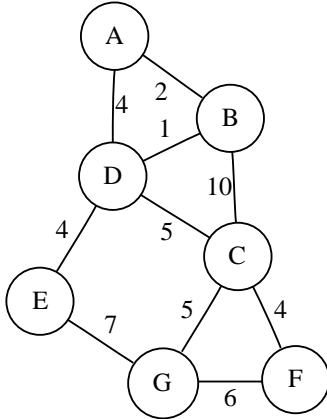
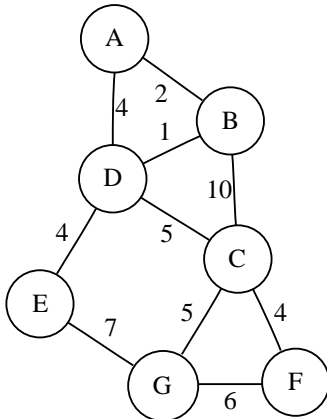


1. (10 points) Using Dijkstra's algorithm, find a shortest path on this graph between A and G , showing your work:



2. (10 points) Using Kruskal's algorithm, find a minimum spanning tree on this graph, showing your work:



3. **(40 points)** For each of the following statements, either prove it (if true) or give a counterexample (if false).

(a) For every even n , a 3-regular simple graph on n vertices exists.

(b) For a graph G and a specific vertex w thereof, if there is a path from w to every vertex $u \in V(G)$, then G is connected.

(c) If G is a simple graph with n vertices and $n-1$ or more edges, then G is connected.

(d) For any vertices u , v , and w in a tree, $d(u, v) + d(v, w) = d(u, w)$.

4. **(5 point bonus)** If a simple graph G has n vertices and n or more edges, then G contains a cycle.