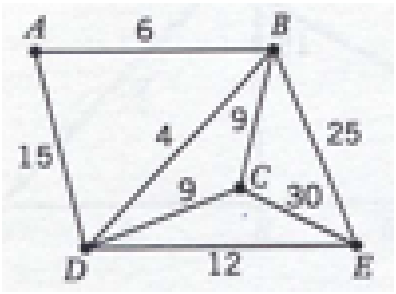
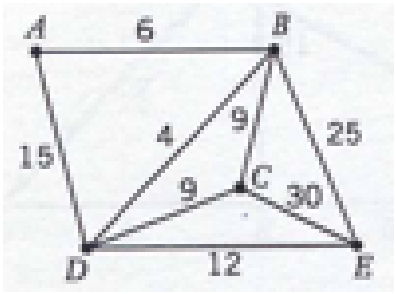
Problem 1 (10 points): [GH 6.3.13] *Use Prim's algorithm to find a minimum spanning tree for the weighted graph (duplicated for your convenience)*





and find the weight of this tree.

Solution: We arbitrarily choose to start at vertex A.

The nearest vertex to A is B, so we add the edge AB to the tree.

The nearest vertex not already contained in the tree is vertex D with a distance of 4 from the tree (edge BD), so we add the edge BD to the tree.

The nearest vertex not already contained in the tree is vertex C with a distance of 9 from the tree (edge BC or edge CD), so we add the edge BC (choosing it arbitrarily over edge CD) to the tree.

The nearest vertex not already contained in the tree is vertex E with a distance of 12 from the tree (edge DE), so we add the edge DE to the tree.

As all the vertices are contained in the tree, we have a minimal spanning tree consisting of edges $\{AB, BD, BC, DE\}$.

We note that the other possible minimum spanning tree consists of the edges $\{AB, BD, CD, DE\}$.