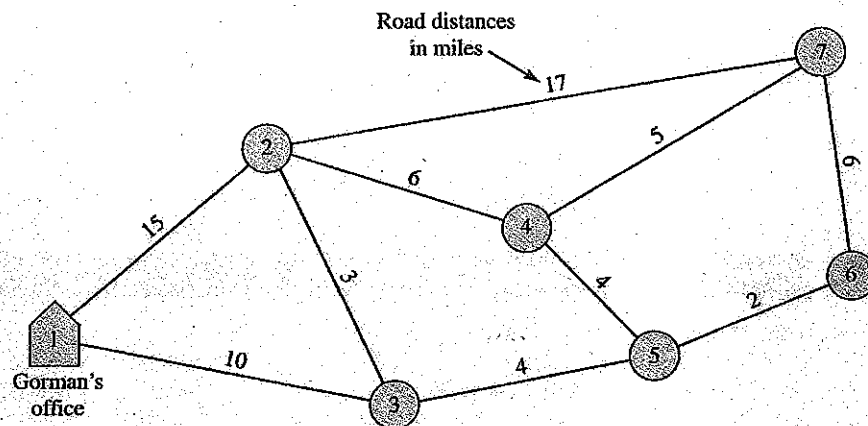


A Shortest Route Algorithm

(See Anderson, et.al., *Introduction to Management Science*, 11th Ed.)



- Step 1. Assign node 1 the permanent label $[0, S]$. The 0 indicates that the distance from node 1 to itself is zero and the S indicates that node 1 is the starting node.
- Step 2. Compute tentative labels for the nodes that can be reached directly from node 1. The first number in each label is the direct distance from node 1 to the node in question; we refer to this portion of the label as the distance value. The second number in each label, which we refer to as the preceding node value, indicates the preceding node on the route from node 1 to the node in question; thus, in this step the preceding node value is 1 because we are only considering nodes that can be directly reached from node 1.
- Step 3. Identify the tentatively labeled node with the smallest distance value, and declare that node permanently labeled. If all nodes are permanently labeled, go to step 5.
- Step 4. Consider the remaining nodes that are not permanently labeled and that can be reached directly from the new permanently labeled node identified in step 3. Compute new tentative labels for these nodes as follows:
 - a. If the node in question has a tentative label, add the distance value at the new permanently labeled node to the direct distance from the new permanently labeled node to the node in question. If this sum is less than the distance value for the node in question, reset the distance value for this node equal to this sum; in addition, set the preceding node value equal to the new permanently labeled node that provided the smaller distance. Go to step 3.
 - b. If the node in question is not yet labeled, create a tentative label by adding the distance value at the new permanently labeled node to the direct distance from the new permanently labeled node to the node in question. The preceding node value is set equal to the new permanently labeled node. Go to step 3.
- Step 5. The permanent labels identify both the shortest distance from node 1 to each node and the preceding node on the shortest route. The shortest route to a given node can be found by starting at the given node and moving backward to its preceding node. Continuing this backward movement through the network will provide the shortest route from node 1 to the node in question.

