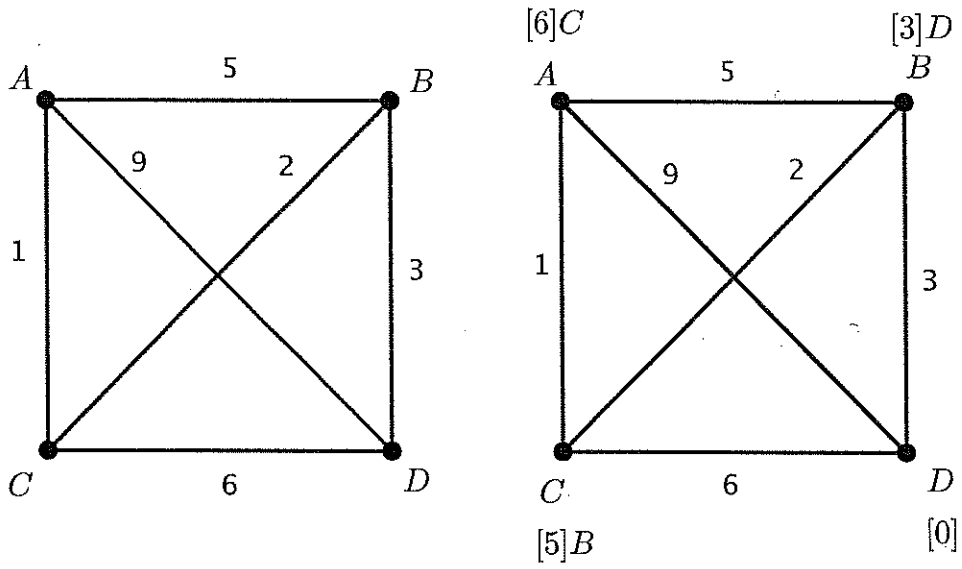
Dijkstra's Algorithm
November 30, 2018

Dijkstra's Algorithm is EFFICIENT and OPTIMAL

Output from Dijkstra's Shortest Path Algorithm for a Weighted Graph

A vertex is selected to be the destination. It is given the label [0]. Each other vertex is ultimately labeled with a number (the total shortest distance to the destination vertex) and the name of a vertex (the first step to take along the shortest path). So the label [12]D means "you are at a distance of 12 from your final destination, and you should now go to D."

Example:



INPUT OUTPUT

Use the output to determine the shortest path from A to D. List the vertices along this path.

A -> C -> B -> D

Running Dijkstra's Algorithm

1. A vertex is selected to be the destination. It is given the label [0]. Each other vertex is ultimately labeled with a number (the total shortest distance to the destination vertex) and the name of a vertex (the first step to take along the shortest path). Initially these labels are temporary and may be revised. They are made permanent one by one.

2. Locate the vertex X having the temporary label with the smallest distance. Circle that label, marking it as permanent.

3. For each vertex Y directly connected to X having a temporary label, add these numbers:

   - the weight of the edge from this vertex to X, and
   - the distance from X to the destination.

   Label this vertex Y with this sum (distance) and with X UNLESS Y is already labeled with a smaller distance.

4. Repeat steps 2 and 3 until all labels are permanent.