Traversing Solutions

March 4, 2020

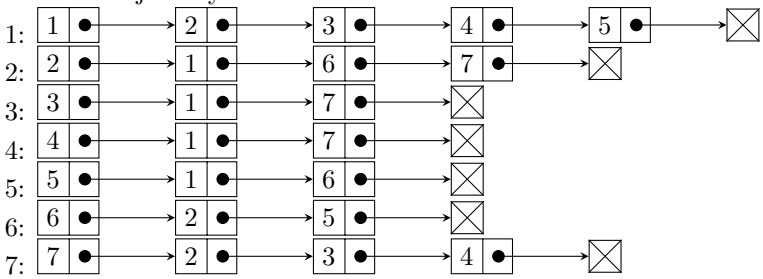
B.2

B.2.1

The adjacency matrix for the graph is below:

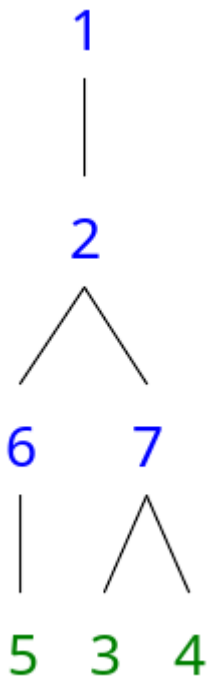
$$\begin{pmatrix} 0 & 1 & 1 & 1 & 1 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 1 & 1 \\ 1 & 0 & 0 & 0 & 0 & 0 & 1 \\ 1 & 0 & 0 & 0 & 0 & 0 & 1 \\ 1 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 1 & 0 & 0 & 1 & 0 & 0 \\ 0 & 1 & 1 & 1 & 0 & 0 & 0 \end{pmatrix}$$

And the adjacency linked list is below:



B.2.2

The depth-first search tree for the graph in question B.2.1 is below:



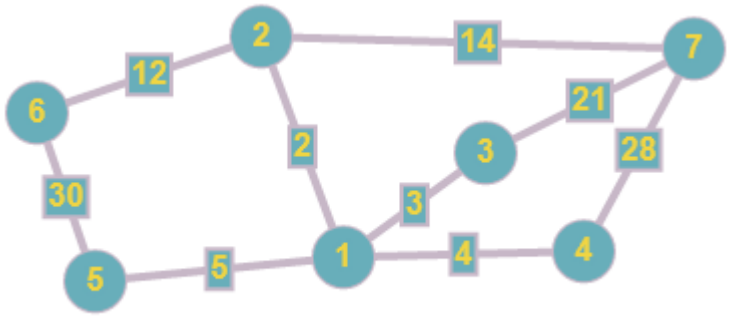
The table for when the in which the vertices are reached for the first time and he order in which the vertices become dead ends is below:

Vertex	1	2	3	4	5	6	7
On	1	2	6	7	4	3	5
Off	7	6	3	4	1	2	5

Hence the order in which the vertices are reached for the first time is: 1,2,6,5,7,3,4
And the order in which the vertices become dead ends are: 5,6,3,4,7,2,1

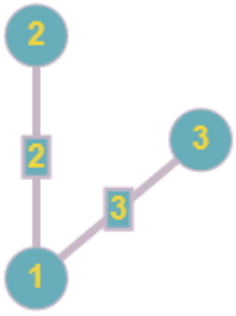
2.3

, The graph with the addition of the weights is below:

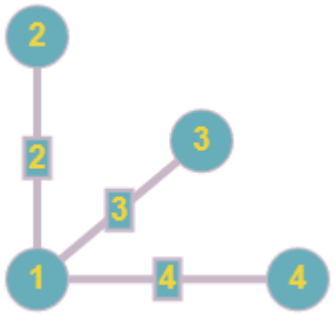


As Kruskal's algorithm runs it firsts adds the edge with the smallest weight to the tree, which is the edge between vertices '1' and '2' with weight 2.

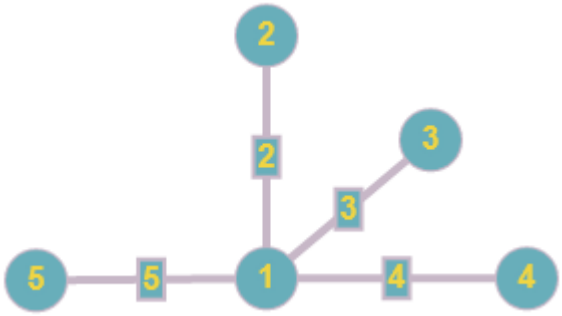
Secondly, it adds the edge between '1' and '3' with weight 3.



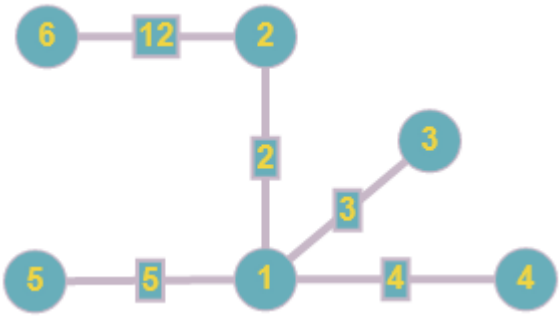
Then, the algorithm will add the next smallest edge, the edge between '1' and '4' with weight 4.



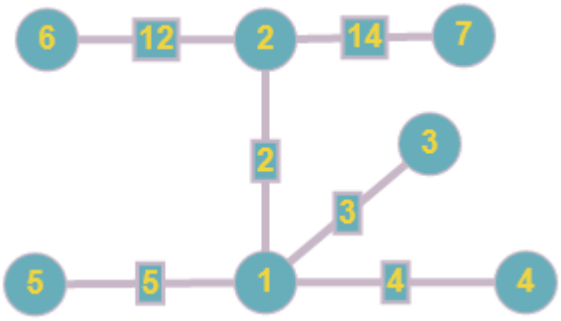
The next edge added is the node between ’1’ and ’5’ with weight 5.



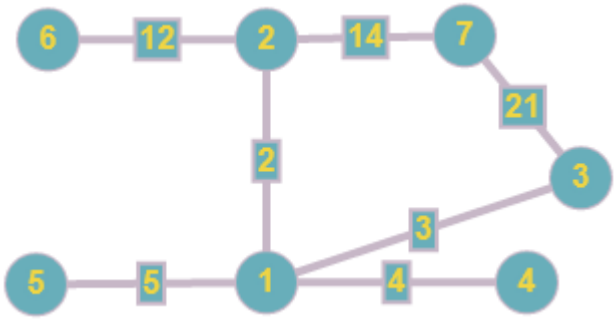
Then, the algorithm will add the edge between ’2’ and ’6’ with weight 12.



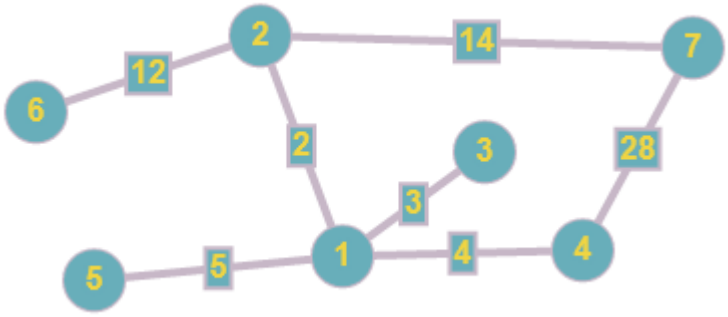
The algorithm then finds the next smallest edge, the edge between ’2’ and ’7’ with weight 14 and adds it.



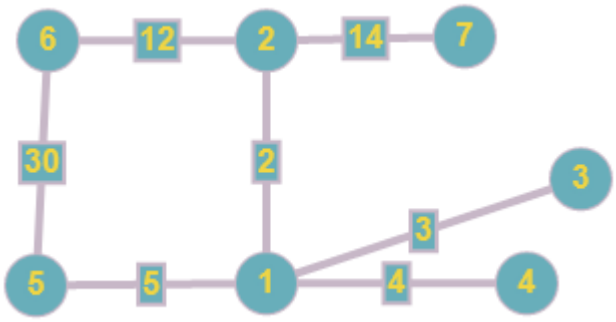
The algorithm then looks at the next smallest edge, which is the edge between '3' and '7' which has a weight of 21. However this will not be added as it would create a cycle, '1,2,7,3,1'.



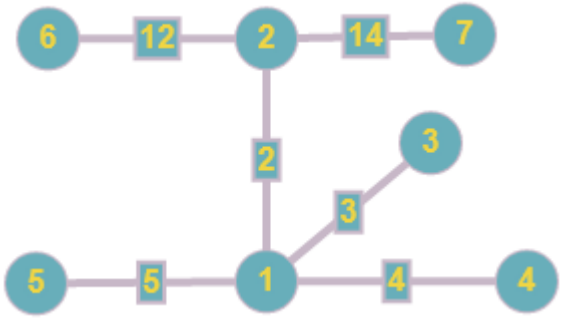
The next edge the algorithm looks at is the edge between '4' and '7' which has weight 28. This will not be added as it would create a cycle '1,2,7,4,1'.



Finally the algorithm looks at the edge between '5' and '6' which has a weight of 30. However this is not added as it would create a cycle, '1,2,6,5,1'.



So the final order minimum spanning tree is:



With total weight (cost) is 40.