

CT Graphs: B.2 Traversing Problem

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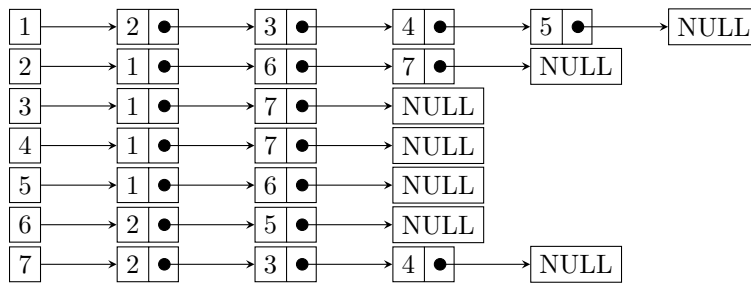
B.2.1

The adjacency matrix is:

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

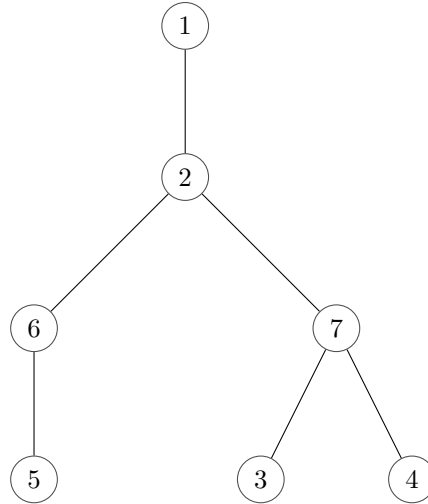
where row i and column j represent node i and node j respectively.

The adjacency linked lists are:



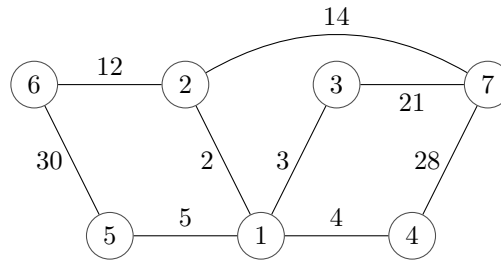
B.2.2

The DFS tree for the graph is: (left paths were followed before the right paths)



The order in which the vertices were visited was 1, 2, 6, 5, 7, 3, 4.
The order in which the vertices became dead ends was 5, 6, 3, 4, 7, 2, 1.

B.2.3



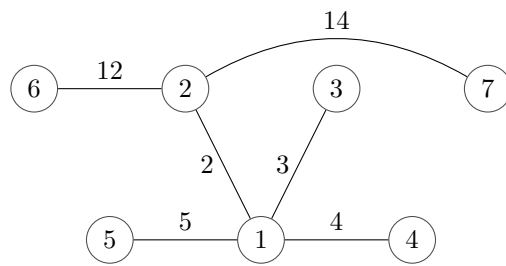
The edges sorted by their weights are as follows:

$$edges = \{(1, 2) : 2, (1, 3) : 3, (1, 4) : 4, (1, 5) : 5, (2, 6) : 12, (2, 7) : 14, (3, 7) : 21, (4, 7) : 28, (5, 6) : 30\}$$

The order they are considered in and whether they were used is:

1. (1, 2) does not cause a cycle therefore it is added to the tree.
2. (1, 3) does not cause a cycle therefore it is added to the tree.
3. (1, 4) does not cause a cycle therefore it is added to the tree.
4. (1, 5) does not cause a cycle therefore it is added to the tree.
5. (2, 6) does not cause a cycle therefore it is added to the tree.
6. (2, 7) does not cause a cycle therefore it is added to the tree.
7. (3, 7) causes a cycle therefore it is rejected.
8. (4, 7) causes a cycle therefore it is rejected.
9. (5, 6) causes a cycle therefore it is rejected.

This produces the minimum spanning tree:



It has total weight 40.