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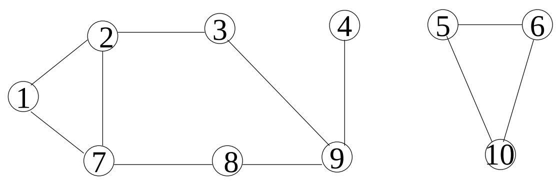
Fundamental Algorithms

Question 1

Let G be an undirected connected graph with weight function $w : E \leftarrow R$, and suppose that all edge weights are distinct. Show that the minimum spanning tree is unique.

Question 2

a) In which order could the DFS algorithm visit the nodes in the following graph?
b) In wich order could the BFS algorithm visit the nodes in the following graph?



Question 3

Given a discrete memoryless source which emits 8 words $w_1, \ldots, w_8$ with the following probabilities:

$$P(w_1) = 0.3, P(w_2) = 0.15, P(w_3) = 0.1, P(w_4) = 0.15,$$
$$P(w_5) = 0.05, P(w_6) = 0.05, P(w_7) = 0.8, P(w_8) = 0.12.$$

a) Find a compact code over the alphabet $\{0, 1\}$
b) Find a compact code over the alphabet $\{0, 1, 2\}$.