COMP 4001 - Assignment C

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Question 1

Question 2

Pseudo-code of the flooding algorithm from a given node

Question 3

- We prove the statement using contradiction. Let G be the graph whose edges have distinct weights, and G also have 2 different MST T and T'. Because they are different, T and T' must contain different edges, therefore the set of all edges belong to T but not T', or belong to T' but not T, must not be empty.
- Consider the smallest edge e that belong to at most subgraph T or T'. Without the loss of generality, We assume that $e \in T \backslash T'$
- Adding this edge to T' will create a cycle (according to spanning tree definition). We consider 2 cases:
    - if all edges in the cycle in T' are in T, then T contains a cycle, which contradicts the fact that T is a spanning tree
    - There exists an edge $e' \notin T$ in the cycle. Know that remove e' from the cycle results in a spanning tree. But since $w(e') > w(e)$, since e is the smallest distinct edge and all edges in G have different weights, removing e' will create a smaller spanning tree. This contradict the fact that T' is the MST.
- Thus, by contradiction, we conclude that if all edges in a graph G have distinct weights, then there is exactly one MST for G.

Question 4

Question 5

Question 6

Question 7

Question 8

Question 9

Question 10

Question 11