CSC 373 Tutorial Problems for Week 3 Winter 2019

0. Did you remember to trace Dijkstra's algorithm on a few examples?...

1. If graph G is connected and contains more than n-1 edges (where n = |V|, as usual), and if there is a unique edge e with minimum cost, then is e guaranteed to be in *every* MST of G?
   If so, give a convincing argument.
   If not, provide a counter-example. In this case, what other conditions can you put on G to guarantee that e will be in every MST of G?

2. If graph G is connected and contains more than n-1 edges (where n = |V|, as usual), and if there is a unique edge e with maximum cost, then is e guaranteed to be in *no* MST of G?
   If so, give a convincing argument.
   If not, provide a counter-example. In this case, what other conditions can you put on G to guarantee that e will be in no MST of G?

3. Prove that the "reverse-delete" algorithm for MSTs is correct (always outputs a MST). Use the general structure from class (proving that every partial solution is "promising"), suitably adapted to fit the algorithm -- in other words, define carefully what the partial solutions are, and what it mans for a partial solution to be promising.

   *Explore: what is the most efficient implementation of the reverse-delete algorithm you can come up with?