

CSE 101: Homework 1

Due: Day 8

When presenting an algorithm, make sure you have:

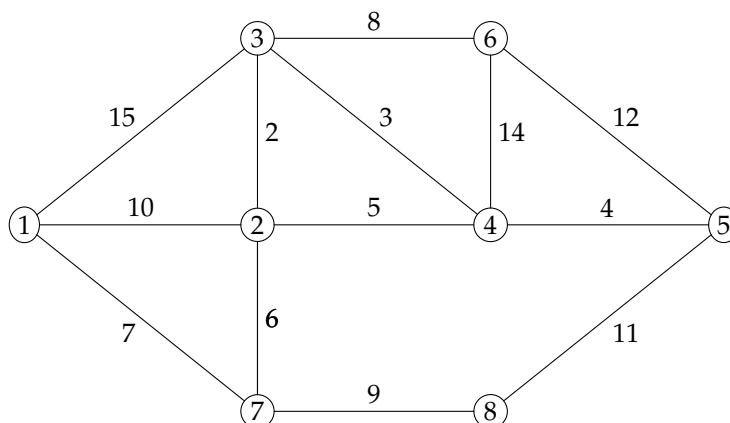
- A clear (pseudo-code) description of the algorithm
- A proof that it is correct (loop invariants may help)
- An analysis of its runtime (stating the runtime isn't sufficient, provide a proof or justification).

For full credit, you need all three pieces.

Exercises

Kleinberg refers to the class textbook *Algorithm Design* by Kleinberg and Tardos.

1. For the following graph, use Dykstra's algorithm to determine the distances from node 1 to each other node. Show the distances in the order that Dykstra's algorithm determines them. *10 pts.*



2. For the previous graph, provide the edges added to the MST *in order* using Prim's algorithm (starting with node 1) and Kruskal's algorithm. *10 pts.*
3. *Kleinberg Chapter 4, Exercise 2. 10 pts.*
4. *Kleinberg Chapter 4, Exercise 3. 10 pts.*
5. *Kleinberg Chapter 4, Exercise 12. 20 pts.*
6. *Kleinberg Chapter 4, Exercise 19. 20 pts.*
7. *Kleinberg Chapter 4, Exercise 21. 20 pts.*
8. *Kleinberg Chapter 4, Exercise 29. Extra credit, 20 points*