Quiz: Kruskal's algorithm

CS 14 - Data Structures

June 5, 2013

1. You should be able to answer all the questions for Prim's and Dijkstra's algorithm about Kruskal's algorithm. Likewise, you should be able to do this quiz on both of those algorithms.

2. We are implementing Kruskal's algorithm, and must decide which data structures to use to implement the maps and priority queues.

   (a) Fill out the table below describing the run time and memory costs of these map functions when implemented with the corresponding data structure. Use Θ notation.

		Hash table	AVL Tree
run times	construction		
	insert		
	delete		
	find		
memory usage			

   (b) Fill out the table below describing the run time and memory costs of these priority queue functions when implemented with the corresponding data structure. Use Θ notation.

		list	binary heap
run times	construction		
	findMin		
	removeMin		
	insert		
memory usage			

(c) Now, calculate the run time and memory usage of Kruskal's algorithm using each combination of data structures. In a test, the code or pseudocode will be provided. For partial credit, you must show your work by writing the run times next to each line. If you make any assumptions, you MUST explicitly state them.

Which combination has the fastest run time?

Which combination has the least memory usage?

You may assume:

- We can check if two trees are equal in constant time, and we can insert edges and vertices into trees in constant time. (Yes, this is possible in this case. Can you figure out how? Good chance this will be an extra credit on the test.)

Other assumptions: