Math 3330 - Assignment 4 - Fall 2011.

Deadline: Tuesday, November 1st, 2:35 pm.

Late assignments (5 minutes to three days) will be penalized 10%.

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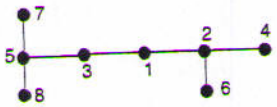
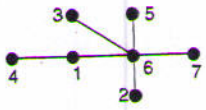
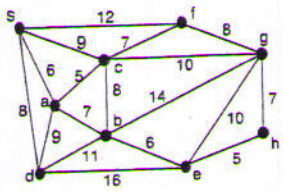
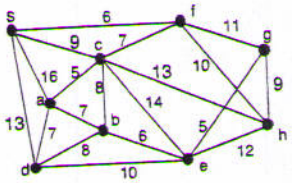
1. Encode each of the following labeled trees as a Prüfer sequence. Then decode the resulting sequences to get labeled trees. State a result that is demonstrated by these computations.





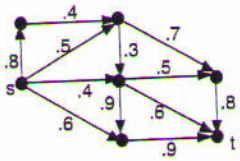
2. Apply Prim's algorithm to the following weighted graphs with starting vertex s. In each case, draw the minimum spanning tree that it results, and indicate its total weight. Give the discovery number of each vertex as well.





3. Apply Dijkstra's algorithm to the weighted graphs given in Question 2 with starting vertex s. Also, draw the shortest-path tree that it results. In each case, give the discovery number of each vertex and its distance from s.

4. Suppose that the weighted graph shown below represents a communication network, where the weight P_{ij} on the edge ij is the probability that the link from i to j does not fail. If the link failures are independent from one another, then the probability that a path does not fail is the product of the link probabilities for that path. Under these assumptions, find the most reliable path from s to t using one of the algorithms covered in class.
Hint: Recall that $\log(ab) = \log a + \log b$.



Comments: The submitted solutions must be tidy and legible. You are to provide full solutions to the problems. You are allowed, and encouraged to collaborate with your classmates, but the write-ups should be done individually, without access to the papers of fellow students. Copying assignments or tests from any source, completely or partially, allowing others to copy your work, will not be tolerated.