

Network Optimization (Fall 2008) — Homework 4

- Exercises marked with a [G] target the graduate students (Math 566), but undergrads can attempt them for extra credit.
- You **must** attempt problem 6.
- The total points (given in parentheses) add up to 120. Math 566 students will be graded for 115 points, and Math 466 students for 100 points.
- **This homework is due in class on Thursday, September 25.**

1. (20) AMO 3.10 (page 87).
2. (15) AMO 3.28 (page 90).
3. (20) AMO 3.34 (page 90).

The definition of the diameter of a *directed* graph as given in this problem is ambiguous. Instead, use the following definition. The *distance* from node i to node j is the length of a shortest directed path from node i to node j . Note that *length* is measured as the number of arcs in the path. The diameter of a directed graph is then defined as the *longest* distance from any node to any other node in the graph.

4. (20) [G] AMO 3.39 (page 91).
5. (20) AMO 3.37 (page 91). *Transitive closure* of a graph is defined in Problem AMO 3.35 (page 90).
6. (25) Write a MATLAB code that takes as input the forward star representation of a network and a starting node s , and performs the breadth-first search on the network. The program should output the *pred* vector as well as the BFS *order* vector. Name your file as `BFS_firstname_lastname.m` and email the MATLAB file to me.