Network Optimization — Homework I

- AMO stands for the text (Ahuja, Magnanti, and Orlin).
- Exercises and page numbers are listed from AMO.
- The total points (given in parentheses) add up to 115. You will be graded for 100 points (with the possibility of getting up to 15 points as extra credit).
- Try to provide sound arguments from first principles to prove most of the results.
- This homework is due in class next Thursday, Sept 2.

1. (20) AMO 1.2 (page 20).
2. (25) AMO 1.3 (page 21).
3. We have seen the min-cost flow formulation of the seat-sharing problem in class.
   (a) (10) Can you model this problem as a circulation problem? Justify your yes/no answer.
   (b) (15) We had assumed that the cars had enough capacity to hold all the members of all the families. Now, we want to minimize the total number of cars used, by filling out the cars with bigger capacities first. How will you modify the network flow model to achieve this objective?
4. (10) AMO 2.5 (a),(b) (page 48).
5. (15) AMO 2.7 (page 49).
6. (10) AMO 2.13 (c) (page 49). Use only the definition of a tree given in class.
7. (10) AMO 2.21 (a) (page 49).