Due: Wednesday, November 26th (in class)

Reminder

The final exam will take place Friday, December 12th at noon in SUR 3340.

Reading

Chapters 12 and 13 (the last one lightly).

Problems for Math 408 and Math 708

1. Chapter 10 problem 1.

2. Formulate the integer programming master problem and subproblems for the clustering problem presented in Section 11.5.

3. Show that the greedy heuristic applied to the maximum matching problem guarantees an approximation ratio of $\frac{1}{2}$, but not $\frac{1}{2} + \epsilon$ for any $\epsilon > 0$.

4. Using a mathematical software package such as MATLAB, generate 12 points in $\mathbb{R}^2$ by choosing each coordinate to be an integer uniformly at random in the range $[1, 100]$. Compute the matrix of pairwise distances between these points. (You can round the distances to the nearest integers.) Please include a computer printout showing the points and the pairwise distances.

Apply the Christofides heuristic to find a good tour through these points. Draw a picture illustrating the points, the minimum spanning tree, the matching edges and the found tour. Can you improve this solutions by exchanging a pair of vertices?

5. Chapter 12 problem 2.

Additional Problems for Math 708

6. Chapter 10 problem 5.

7. Chapter 11 problem 1. Note the conventions used for UFL may not be consistent between Chapters 10 and 11.

8. Chapter 12, problem 4.

Tentative schedule of graduate presentations

Recall that each graduate student will present a brief introductory lecture on a current topic in integer programming. This should contain mathematical content and be understandable to the undergraduate students. The talks will be 20 minutes, followed by a 5 minute question period. Overheads will be submitted as part of the grading.

These talks will take place during the final two class periods of the term. The tentative schedule and topics are as follows:

Friday, November 28th (early) **Evan (Xiao) Luo** on Mixed Integer Programming.

Friday, November 28th (late) **Olga Zasenko** on Augmentation Methods for Convex Integer Programming.

Monday, December 1st (early) **Alireza Ebadighajari** on Second Order Cone Programming (SOCP) in Discrete Optimization.

Monday, December 1st (late) **Jingbo Tian** on Symmetry in Integer Programming.

Please let me know about any possible errors in this schedule.