

Due: Thursday, October 31st 11:59 p.m.

Problems for Math 408 and Math 708

1. Returning to your *team multi-constrained knapsack problem*, show the matrices B and N corresponding to the basic and non-basic variables at the (non-integer) optimal solution x_0^* to the LP relaxation. Use this information to cut the current basis using the procedure described in class 10, adding a single cut the of the form $\sum_{j \in N} x_j \geq 1$. Then reoptimize the system with this cut. Compare the known optimal solution from question 1 c. of the first team homework to the objective value of x_0^* , as well as the reoptimized value.
2. Repeat the above, but now instead of using cut from class 10, find a Gomory cut that removes x_0^* . Reoptimize the relaxed system with the added Gomory cut, and compare the relaxed value to the one found in question 1 of this assignment. If the new solution x_1^* is integer, then you are done. Otherwise proceed to find a new Gomory cut, which removes x_1^* .
3. Apply the *2-opt* heuristic to the tour that you generated from the nearest neighbour heuristic in Stage 2. Repeat for the tour generated from the Christofides heuristic in Stage 2.
4. Make a table showing the cost of the four tours that you found in Stage 2 (the previous homework), along with the two new tours from question 2 of this homework. Which of these tours is the shortest? Can you find a way to improve it?

This assignment will be submitted directly to the instructor by e-mail. Please submit a single file named `team_hw3_name.pdf` containing all your written work, with your group identifier substituted in place of `name`.