Due March 7, Exam March 14. No class Mar 19-23.

1. Given the following knapsack constraint. For every inequality generated, prove that it is useful by finding a linear relaxation point that is eliminated by the inequality.

35x1+27x2 +23x3+19x4+15x5+15x6+12x7+8x8+6x9+3x10≤39.

x∈B10

a. This problem has a lot of covers. Find an extended cover inequality that is facet defining. (prove that it is a facet)

a. Take the cover {6,7,8,9} and sequentially lift it to make it facet-defining. Also prove that it is facet defining.

b. Take the cover from b and simultaneously lift {3,4,5} and then simultaneously lift {1,2}. Determine the dimension of the inequalities new face and whether or not it is facet defining? You may use a software package, Excel, IOR or CPLEX, COIN-IR for software to aid in solving integer programs.

c. Given the cover, use Balas’ theorem to provide a strong approximate lifting inequality.

2. Find and prove a facet defining inequality to the following IP. Your facet defining inequality must be useful and cutoff a linear relaxation point.

36x1+27x2 +12x3+6x4+4x5+2x6 =39.

x∈{0,1}6