ISyE 4232 Exam #2
Spring 2014

Name

Please be neat and show all your work so that I can give you partial credit.
GOOD LUCK AND HAVE A WONDERFUL SUMMER.

Question 1
Question 2
Question 3
Question 4
Total

(25) **1.** Consider the following inventory problem that we discussed in class. An appliance store can place orders for refrigerators at the beginning of each month for immediate delivery. A fixed cost of \$100 is incurred every time an order is placed. The storage cost per refrigerator per month is \$5. The penalty for running out of stock is estimated at \$150 per refrigerator per month. The monthly demand has the following probability density function: $P\{D = 0\} = 0.2$, $P\{D = 1\} = 0.5$, and $P\{D = 2\} = 0.3$. The store's policy is that the maximum stock level should not exceed two refrigerators in any single month. Assuming that each inventory level has a terminal reward of 0 determine the optimal ordering policy over the next 3 months.

(25) **2.** Consider the problem of question 1. Now assume that your objective is to determine the optimal ordering policy for the infinite horizon discounted model when the discount factor $\alpha = 0.6$. Use any method you like to compute this optimal policy.

(25) **3.** Consider a model $S = \{s_1, s_2\}$, $A_{s_1} = \{a_{11}, a_{12}\}$, $A_{s_2} = \{a_{21}, a_{22}, a_{23}\}$, $r(s_1, a_{11}) = 1$, $r(s_1, a_{12}) = 4$, $r(s_2, a_{21}) = 2$,$r(s_2, a_{22}) = 3$, $r(s_2, a_{23}) = 5$, $p(s_1|s_1, a_{11}) = 1$, $p(s_1|s_1, a_{12}) = \frac{1}{2}$, $p(s_1|s_2, a_{21}) = 1$, $p(s_1|s_2, a_{22}) = 0$, and $p(s_1|s_2, a_{23}) = 3/4$.

a. Determine the chain structure of each stationary deterministic policy.

b. Compute the gain under each stationary deterministic policy.

c. If you were asked to compute the long-run average optimal policy using the LP method, how would you do it?

(25) **4.** Four children are playing two video games. The first game, which takes an average of 4 minutes to play, is not very exciting, so when a child completes a turn on it they always stand in line to play the other one. The second one, which takes an average of 8 minutes, is more interesting so when they are done they will get back in line to play it with probability 1/2 or go to the other machine with probability 1/2. Assuming that the turns take an exponentially distributed amount of time, find the stationary distribution of the number of children at the two machines.