**Discrete Time Markov Handout**

1.

Assume that the weather is only dependant upon yesterday's weather. If it rained yesterday, then it will rain today with a probability of .5. If it was sunny yesterday, then it will be sunny today with a probability of .8. Find the long run probability that there is going to be a sunny day. If you receive 10 satisfaction from a sunny day and 2 satisfaction from a rainy day, what is your expected satisfication.

2.

I always maintain 4 umbrellas that are either at my car or office. If it is raining, I take an umbrella with me to the other location. I estimate that it rains .25% of the time. What porportion of the time do I get rained on?

Due to the winds in Kansas, I break an umbrella 10% of the times that I use one. What is my estimated umbrella cost per year? Assume an umbrella costs $10.

I assume a penalty of $5 for getting rained on, should I buy another umbrella?

To obtain an inverse in excel, type out the matrix in an n x n set of consecutive cells. Highlight another set of n x n consecutive cells. In the first cell type =minverse(starting cell:ending cell). Then press ctrl-shift-enter and the matrix should appear.

3.
My family and I either eat out, eat a family dinner or each person fends for his/herself. We base the decision on what happened the night before. If we fended for ourselves last night, then we will go out to dinner tonight. If not then we will fend for ourselves 20% of the time. If we ate out the night before, then we will eat out with a probability of .1. If we had a family dinner the night before, then we will eat out with a probability of .3. Assuming that we eat out for $25 with probability .6 and $35 with probability .4, $15 for a family meal and $10 for a fend for yourself meal, what is the expected weekly cost of our dinners.

4.

Let a hair salon have enough seats for two people waiting. If the barber cuts hair with an expo(4) and the interarrivals occur with an expo (8), what is the average number of people in the system. If a hair cut brings in $8 of profit, what is the expected profit. Would it be beneficial to hire another hair stylist if they can work expo (2) and cost $10 per hour?

What happens if people balk ½ the time when there is not an available barber.

What would happen if there were two barbers.

The interarrival of people at the security line at the airport is exponential with a rate of 12 per hour. The security has one set of guards and can process people according to an exponential distribution with a rate of 16 per hour. What is the probability that there are is noone in line.

See book for discussion