Homework 4
Ma623 Stochastic Processes
due Tuesday April 3, 2006

For this assignment please do the following problems:

page 73 (ch 2) problem 1, page 78 problems 9 and 11 (note that the problem 10 has been done in class)

page 108 (ch 3) problem 2.

In addition do the following exercises:

(I) A fair six sided die has sides: $10, 15, 25, 40, 45, 75$. Let S_n be the sum of the first n rolls and $N(t)$ the number of times the die was rolled before reaching the total t.

Calculate:

   (a) $\mathbf{P}(S_n = 2,678,495 \text{ for some } n)$

   (b) The 95th percentile of $N(2,678,495)$

(II) Suppose X is a MC with transition matrix: $P = \begin{pmatrix} p & 1-p \\ 1-q & q \end{pmatrix}$.

Show that $Y_n = (X_n, X_{n+1})$ is also a Markov chain. Find its transition probability and the stationary distribution (if it exists).

(III) *(SIMULATION PROBLEM). There are many theoretical results for Markov Chains, however in many cases simulation is the most expedient way to study them.*

Suppose there are n people on a Stevens committee discussing the heating issue in the Kidde building. Assume that every time one speaker finishes, one of the other $n-1$ speakers are equally likely to continue the debate. Further, assume that each person speaks an exponential amount of time with parameter λ. How long does it take on average for all the members of the committee to take part in the discussion.