

# HOMEWORK 1

STA 724.01, Applied Stochastic Processes  
Spring Semester, 2007

**Due:** Friday, January 19, 2007

Most of this assignment is about basic probability and enough MATLAB so that I'm sure you've tried the program and are able to start it up. Under Course Documents you will find a basic guide to probability, and six tutorials on MATLAB.

For this assignment, you'll need to read the guide, the first tutorial in its entirety, and skim the third tutorial. (Later on you will need to know everything in the second tutorial if you just want to read in order. The remaining tutorials will not be required, they are just there for completeness if you want to learn more about MATLAB.)

**1** Suppose that I have a red 8 sided die and a blue 4 sided die that I roll independently.

- What is the probability that the red die shows an even number?
- What is the probability that the sum of the dice is 5?
- What is the probability that the red die shows an even number conditioned on the sum of the two dice equalling 4?
- What is the expected value for each of the dice?
- What is the expected value for the sum of the dice?
- What is the variance of the red die?

**2** Suppose  $X$  is a continuous random variable with density  $Cs^{-2.5}1(s > 1)$ , where  $C$  is the constant that makes this a probability density.

- What is  $C$ ?
- What is  $E[X]$ ?
- What is  $\text{Var}(X)$ ?

**3** Let

$$A = \begin{bmatrix} .1 & .9 & 0 & 0 \\ .1 & .2 & .7 & 0 \\ .8 & .1 & 0 & .1 \\ .2 & .5 & .1 & .2 \end{bmatrix}$$

and  $x^T = [ 0 \quad .3 \quad .5 \quad .2 ]$ .

- Evaluate  $x^T A$ .
- Find the eigenvalues of  $A$ .