CPMA 521, Fall 2001
Professor Larget
Assignment #2: due September 17, 2001

1. Inspired by the recently completed U.S. Open, consider problem 1.2. Instead of the problems asked, answer the following:

   (a) Find an expression in p and $q = 1 - p$ for the probability that the game first enters the final stage at Deuce/30–30.

   (b) Let a be the expected number of points remaining when the game is at Advantage B/30–40, b be the expected number of points remaining when the game is at Deuce/30–30, and c be the expected remaining number of points when the game is at Advantage A/40–30. Condition on the next point to find an expression for each of a, b, and c. (For example, $a = 1 \times q + (1+b) \times p$. Solve these three equations in three unknowns for fixed p and q and then evaluate when $p = q = 1/2$.

   (c) Complete the S-PLUS program on the Web page to simulate the probability that A wins the game when $p = 0.6$. Your function should allow you to "play" the game

2. A density function is $f(x) = cx^2(2 - x)$ for $0 < x < 2$.

   (a) Find the value of c.

   (b) Evaluate the probability that a random variable X from this distribution is less than 1.

   (c) Find the mean and variance of this distribution.

   (d) Use S-PLUS or R to graph the density of this function.

3. Problem 1.45. *Hint: Condition on x.*

4. Problem 1.42. Either solve analytically or write an S-PLUS or R program to simulate the problem and guess at the answer.