Statistics 394, Problem Set 2

Wellner; 1/12/2000

Reading: Kelly, Chapter 1, Section 1.3; Chapter 2, Sections 2.1, 2.2, and begin 2.3.
Due: Wednesday, January 19, 2000.

1. K, 1.2, # 13.

2. K, 2.1, # 7.

3. K, 2.1, # 10.

4. K, 2.1, # 15.

5. A coin of radius r is thrown onto the unit square $[0,1] \times [0,1]$ in such a way that its center is uniformly distributed over the unit square. Find the probability that the coin intersects the edge (or boundary) of the square as a function of r. (See the "Buffon coin experiment" at the *Virtual Laboratory for Probability and Statistics* at

   `http://www.math.uah.edu/stat/prob/index.html . )`

6. Two dice are thrown n times in succession. Compute the probability that double 6 appears at least once. How large does n need to be to make this probability at least 1/2?

7. The following data were given in a study of a group of 1000 subscribers to a certain magazine: in reference to sex, marital status, and eductation there were 312 males, 470 married persons, 525 college graduates, 42 male college graduates, 147 married college graduates, 86 married males, and 25 married male college graduates. Show that the numbers reported in the study must be incorrect.
   Hint: Let M, W, and G denote, respectively, the set of males, married persons, and college graduates. Assume that one of the 1000 persons is chosen at random, and use (2.1.3) on Kelly page 86 to show that if the above numbers are correct, then $P(M \cup W \cup G) > 1$.

8. **Extra bonus problem:** A child has 12 blocks, of which 6 are black, 4 are red, 1 is white, and 1 is blue. If the child puts the blocks in a line, how many arrangements are possible?