Math 55 worksheet, March 18, 2009

1. Suppose that a test for opium use has a 2% false positive rate and a 5% false negative rate. Furthermore, suppose that 1% of peole actually use opium.

   (a) Find the probability that someone who tests negative for opium use does not use opium.

   (b) Find the probability that someone who tests positive for opium use actually uses opium.

2. Suppose that E, F_1, F_2, F_3 are events from a sample space S and that F_1, F_2, and F_3 are mutually disjoint and their union is S. Find $p(F_2 \mid E)$ if $p(E \mid F_1) = 2/7$, $p(E \mid F_2) = 3/8$, $p(E \mid F_3) = 1/2$, $p(F_1) = 1/6$, $p(F_2) = 1/2$, and $p(F_3) = 1/3$.

3. What is the probability that a five-card poker hand contains exactly one ace? What is the probability of at least one ace?

4. What is the probability that a five-card poker hand contains two pairs, that is, two of each of two different kinds and a fifth card of a third kind?

5. What is the probability that a five-card poker hand contains a flush, that is, five cards of the same suit?

6. Show that if E and F are events, then $p(E \cap F) \geq p(E) + p(F) - 1$.