MAT 2379 3X (Spring 2012)
Assignment 1
***Deadline:* Tuesday, May 21, 2012 (in class)**
There are a total of 5 questions.

1. Under controlled conditions, the probability that a white rat is infected by a virus A is 0.75, the probability that it is infected by a virus B is 0.7, and the probability that it is infected by both viruses is 0.5. Under these conditions,

   (a) what is the probability that a randomly chosen rat becomes infected by at least one of the two viruses?

   (b) what is the probability that a randomly chosen rat becomes infected by virus A, but not virus B?

   (c) what is the probability that a randomly chosen rat becomes infected by a virus, but not both?

2. Two diseases A and B have spread within a certain population. We know that 15% of this population have the disease A, 20% of this population have disease B and 25% have at least one of the two diseases. We choose a random person among this population.

   (a) What is the probability that this person contracted both diseases?

   (b) Given that the chosen individual has at least one of the diseases, what is the probability that this person has contracted both diseases?

3. In a study involving alcoholic subjects, it was found that 42% have alcoholic fathers and 8% have alcoholic mothers. 48% have at least one alcoholic parent. What is the probability that if we choose one of the subjects at random:
   (a) that they have two alcoholic parents?
   (b) they have an alcoholic mother but they do not have an alcoholic father?
   (c) that they have an alcoholic mother, if they have an alcoholic father?
   (d) that they have an alcoholic mother, if they do no have an alcoholic father?

4. Assume that company A makes 80% of all electrocardiograph machines, company B make 15% of them, and the company C makes the other 5%. The electrocardiographs machines made by company A have a 4% rate of defects, the company B machines have a 5% rate of defects, while the company C machines have a 8% rate of defects.
   (a) If a particular electrocardiograph machine is randomly selected from the general population of all such machines, find the probability that is was made by company A.
   (b) If a randomly selected electrocardiograph machine is then tested and is found to be defective. Find the probability that it was made by the company A.
   (c) If a particular electrocardiograph machine is randomly selected from the general population of all such machines, find the probability that it was made by company A and it is defective.
   (d) If a particular electrocardiograph machine is randomly selected from the general population of all such machines, find the probability that it was made by company A and it is not defective.

5. Suppose that 7% of men and 0.25 percent of women are colour-blind. A colour-blind person is chosen at random. What is the probability of this person being male? Assume that there are an equal number of males and females in the general population.