[BAYESEIAN INFERENCE HOMEWORK]

(due monday)

Directions: Show all work and clearly identify your answer for full credit. Answers with no explanation will not receive full credit.

1. One day at the coin-operated laundromat, you meet an attractive blonde stranger. Through talking with this person your mind begins to wander, and you find yourself wondering if this beauty's hair is natural or not. You know that 90% of blonde people in the world are naturally blonde – in fact you have even done a personal survey so you could figure out how accurate your guesses are. Suppose you found (at some earlier time) that you have the ability to correctly categorize fake hair color as fake and real hair color as real 80% of the time. If you believe this persons hair color is dyed, what is the probability that it is natural?

2. You apply for a national scholarship along with 100,000 other students, but only 200 scholarships will be awarded. You call to inquire whether you are one of the winners. The absent-minded professor in charge of the program reports that the letters have just been sent out and tells you that you were selected. If the professor accurately recalls information 90% of the time, what is the probability that you won a scholarship? (for the purpose of this exercise, assume scholarships are awarded at random – but let me assure you, this is not how it actually works)

3. The following table represents the results from a study done to determine the accuracy of a specific test (I made all this information up)

	tests "+" for disease	tests "-" for disease	**totals**
has disease	62	2	64
does not have disease	8	728	736
Totals	70	730	**800 total people**

   a. If you test positive, what are the chances that you don't have the disease?
   b. If you have the disease, what are the chances that you test positive?
   c. If you don't have the disease, what are the chances that you test negative?
   d. Do you think that this test should be used as a diagnostic tool?