

Name _____

Problem Set # 2
Due November 7, 2005

Remember, the work you submit is expected to be your own. You may discuss how to do a problem or problems with your classmates, however, you should actually write out the solutions on your own. We consider any copied or *collaborative* homework solutions to be plagiarism, about which we refer you to the student handbook.

1) A class consists of 60% men and 40% women. Of the men, 25% are blond, while 45% of the women are blond. If a student is chosen at random and is found to be blond, what is the probability that student is a man?

2) A medical research lab proposes a screening test for a disease. To try out this test, it is given to 100 people, 60 of whom are known to have the disease and 40 of whom are known not to have the disease. A positive test indicates the disease and a negative test indicates no disease. Unfortunately, such medical tests can produce two kinds of errors:

I) A false negative test: For the 60 people who do have the disease, this screening indicates that 2 do not have it.

II) A false positive test: For the 40 people who do not have the disease, this screening test indicates that 10 do have it.

- a. Which of the false tests do you think is more serious and why?
- b. What is the probability that the diagnostic test gives a false positive result?
- c. What is the probability that a person with a positive diagnostic test has the disease?

3) Which do you find more surprising:

- a. You sit down on a plane and after conversing with the person next to you for a while, you realize that the two of you have the same birthday.
- b. A fortune teller predicts that you will fall in love with a stranger who has the numbers 34 as the last two of his/her social security number. You then do fall in love with such a person.

Bear in mind that the *a priori* odds of two people having the same birthday are $1/365$. The *a priori* odds of any particular two-digit sequence at the end of your social security number is $1/100$.

Are the pure odds of the coincidences the only things you care about?