Math 105: Finite Mathematics

Homework 5 - Part 1: Due Feb 26, 2008

February 18, 2008

Remember, show your work for full credit on all problems.

1 Conditional Probability

1.1

You are given the following table with results from a random survey of 1000 individuals concerning color-blindness and gender.

	Female	Male	Total
Color-Blind	2	24	26
Normal	518	456	974
Total	520	480	1000

1.1.1

What is the probability of Color-Blindness in the sample population?

1.1.2

What is the probability of being Male given that you are Color-Blind?

1.1.3

What is the probability of being Color-Blind given that you are Female?

1.2

A survey of the residents of a precinct in a large city revealed that 55% of the residents were members of the Democratic party and that 60% of the Democratic party members voted in the last election. What is the probability that a person selected at random from the residents of this precinct is a member of the Democratic party and voted in the last election?

2 Bayes' Rule

2.1

In a random sample of 1000 people, it is found that 7% have a liver ailment. Of those who have a liver ailment, 90% are drinkers and 10% are non-drinkers. Of those who do not have a liver ailment, 80% are drinkers and 20% are non-drinkers. If a person is chosen at random and it is found that he or she is a drinker, what is the probability of that person having a liver ailment? What is the probability for a non-drinker?

2.2

A new test has been developed to detect breast cancer. If you actually have breast cancer, the test will return a positive result 98% of the time (known as true positives), but if you do not have breast cancer, the test will return positive 1% of the time (known as false positives). 2000 women are screened with this new test, and it is known from another source that 100 of them have breast cancer. How many women will the new test say have cancer? What percent of these results are true positives?