Practice Exam 2 Math 150

1. In a paper by Brereton and Casper analyzing whether it is a good idea to plea guilty they had the following data:

   - 392 people sentenced to prison plead guilty while 58 people sentenced to prison plead not guilty.

   - 564 people that plead guilty were not sentenced to prison while 14 people that didn't plead guilty were not sentenced to prison.

   Using this data answer the following questions:

   (a) How many people plead guilty?

   (b) How many people were sentenced to prison?

   (c) If 1 of the 1028 subjects is randomly selected, find the probability of selecting someone sentenced to prison.

   (d) Find the probability of being sentenced to prison, given that the subject entered a plea of guilty.

   (e) Find the probability of being sentenced to prison, given that the subject entered a plea of not guilty.

   (f) If two different study subjects are randomly selected, find the probability that they both were sentenced to prison.

2. Let X be the outcome of a six-sided dice roll.

   (a) What is the probability distribution of X?

   (b) What is the expected value of X?

   (c) What is the variance of X?

   (d) What is the standard deviation of X?

3. Let X be the number of heads that occur after flipping 1000 coins.

   (a) Is X a random variable?

   (b) Does X have a binomial probability distribution?

   (c) What is the expected value of X?

   (d) What is the variance of X?

   (e) What is the standard deviation of X?

   (f) Is the outcome 550 heads unusually high?

   (g) Is the outcome 485 heads unusually low?

4. If you place a bet on the number 7 in roulette, you have a 1/38 probability of winning.

   (a) What is the mean for the number of wins for people who bet on the number 7 fifty times?

   (b) What is the standard deviation for the number of wins for people who bet on the number 7 fifty times?

   (c) Would 0 wins in 50 bets be an unusually low number of wins?

Extra problems to practice

- Try a variant of problem 3 where the probability of success is not 1/2.

- Try a variant of problem 2 with a non-uniform probability distribution.