Stat 1040 Recitation packet 8

1. Five hundred draws will be made at random with replacement from a box with 4 tickets. The tickets are numbered 2, 3, 5, 6.

   (a) Estimate the chance that the sum of the draws will be more than 1,950.

   (b) Estimate the chance of getting fewer than 90 3's.

2. A box contains 4 tickets with negative numbers and 6 tickets with positive numbers. If we draw 100 tickets at random (with replacement), find the chance we get at least 61 positive numbers.

3. Suppose someone plays a game in which they roll a die. If the die lands 1 or 6, they win $1, otherwise, they lose $1. They plan to play the game 400 times.

   (a) *How much money* do we expect them to win? Give or take how much? (Show your work).

   (b) Find the chance they lose more than $135.

   (c) *How many times* do we expect them to win? Give or take how many? (Show your work).

   (d) Find the chance they win more than 140 times.

4. A programmer is working on a new program, COIN, to simulate tossing a coin. As a preliminary test, she sets up the program to do 1 million tosses. The program returns with a count of 502,015 heads. Is something wrong with COIN?

5. A store has "scratch and win" cards that show a prize of $0, $1, $2, or $3. The chance of getting these prizes is 80%, 10%, 7% and 3% respectively. Find the chance that the store has to pay out more than $20 in prizes for the next 50 customers, assuming the prizes really are random.

6. According to a genetic theory, there is a 15% chance that a randomly selected person from a large population has a given gene. If I take a simple random sample of 1000 people from this population, what is the chance that fewer than 140 have this gene?

7. A basketball player claims to have an 80% chance of making any free-throw. Assuming her claim is correct, and that her free-throws are independent, find the expected value and the standard error for the number of free-throws she would make if she tried 30 times.

8. A farmer has a flock of 300 ewes. For this breed of ewes, the chance a ewe will bear a single lamb is .75, the chance she will bear twins is .20, and the chance she will bear no lambs is .05. For the upcoming breeding season, find the chance the farmer will get at least 360 lambs from his 300 ewes.

9. (15 points) For a certain gas station, we have records of the amount of gas purchased in each of several thousand transactions for the last 90 days. The average amount of gas purchased is 9.84 gallons with an SD of 3.92 gallons. If I take a random sample of 100 of these transactions, what is the chance that the TOTAL number of gallons purchased by the sampled cars is more than 1000 gallons?