Dr. Z.'s Intro to Probability Homework assignment 8

1. In a multiple-choice test with 5 possible answers for each of the 10 questions, what is the probability that the student will get 3 or more correct answers just by guessing?

2. What is the probability that when you toss a fair coin n times, the number of heads is strictly larger than a and strictly less than b , if $0 \leq a < b \leq n$?

3. A company prices its hurricane insurance using the following assumptions:

• In any calendar year, there can be at most one hurricane.

• In any calendar year, the probability of a hurricane is 0.07.

• The number of hurricanes in any calendar year is independent of the number of hurricanes in any other year.

Using the company's assumptions, calculate the probability that there are fewer than 4 hurricanes in a 30-year period.

4. A study is being conducted in which the health of two independent groups of twelve policyholders is monitored over a one-year period of time. Individual participants in the study drop out before the end of the study with probability 0.3 (independent of the other participants).

What is the probability that at least 8 participants complete the study in one of the two groups but not the other?

5. A study is being conducted in which the health of three independent groups of ten policyholders is monitored over a one-year period of time. Individual participants in the study drop out before the end of the study with probability 0.2 (independent of the other participants).

What is the probability that at least 7 participants complete the study in one of the three groups but not the other two?

6. A certain loaded die has $P(X = 1) = 0.1, P(X = 2) = 0.2, P(X = 3) = 0.3, P(X = 4) = 0.1, P(X = 5) = 0.2, P(X = 6) = 0.1$. If you roll it 100 times, what is the expected number of times it lands on a prime number? What is the standard-deviation?

7. In a multiple-choice test there are 20 questions, and each question has four choices. Jane is clue-less and answers by pure-guessing, and is equally likely to pick any of the possible choices, and each such choice is independent of the other ones. If it is known that Jane guessed correctly strictly more than six questions correctly, what is the chance that she scored strictly more than eight questions correctly?