

Dr. Z.'s Intro to Probability Homework assignment 10

1. Suppose that your probability of passing a certain test is independent of previous attempts, and the probability of passing it is 0.2. What is the expected number of tries until you pass it? What is the standard deviation of the number of trials?
2. Suppose that in order to qualify to be an actuary you have to pass a test three times, and that your probability of passing any one test is 0.6. You are allowed to take it as many times as you wish. What is the probability that you would need to take it at least five times before you become an actuary? What is the expected number of tests you have to take before you become an actuary? What is the variance of the number of tests you need to take?
3. A fair coin is continually flipped until heads appears for the 10-th time. Let X denote the number of tails that occur. Compute the probability mass function of X .
4. Suppose that a batch of 100 items contains 6 that are defective and 94 that are not defective. If X is the number of defective items in a randomly drawn sample of 10 items from the batch, find $P[X = 0]$ and $P[X < 2]$.
5. You toss a coin, whose probability of Heads is p , 100 times. Let X be the random variable “Number of Heads in the first 50 tosses Plus twice the Number of Heads in the last 50 tosses”. Find $E[X]$.
6. You toss any (not necessarily fair) coin an even number, n , of times.
 - Let Y be the random variable “Twice the Number of Heads in the first $n/2$ tosses Plus three times the Number of Heads in the last $n/2$ tosses”.
 - Let Z be the random variable “The Number of Heads in the first $n/2$ tosses Plus three times the Number of Heads in the last $n/2$ tosses”.If $E[Y] = 80$ and $E[Z] = 70$, what is the expected total number of Heads?