

Math 262

Section 2.6.2

Day 15

1. Suppose that 45% of the phone calls you receive are scam calls. Assume that the probability of a scam call is independent from one call to the next. Let X be the number of calls that you receive until (and including) the next scam call.
 - (a) What is $P(X = 3)$?

 - (b) If n is any positive integer, what is $P(X = n)$?

 - (c) What is $E(X)$?

2. Let Y be the number of calls until (and including) the fourth scam call.
 - (a) What is $P(Y = n)$?

 - (b) What is $E(Y)$?

3. An interviewer must find 10 people who agree to be interviewed. Suppose that when asked, a person agrees to be interviewed with probability 0.4.
 - (a) What is the probability that the interviewer will have to ask exactly 20 people?

 - (b) What are the mean and standard deviation of the number of people that the interviewer will have to ask?

4. If X has a geometric distribution with parameter p , and k is a positive integer, what is $P(X > k)$?

5. Scam calls, again. Suppose that 45% of the phone calls you receive are scam calls.

(a) What is the probability that *none* of the first 4 calls are scam calls?

(b) If none of the first 4 calls are scam calls, what is the probability that none of the first 7 calls are scam calls?

(c) If none of the first 4 calls are scam calls, what is the probability that none of the first $4 + k$ calls are scam calls?

★ **BONUS:** Show that $\sum_{k=1}^{\infty} k(1-p)^{k-1}p = \frac{1}{p}$. This proves that the mean of a geometric random variable is $\frac{1}{p}$. *Hint:* Start with a geometric series. What is its sum? Then differentiate.