

STA 4321

Spring 2019

Quiz 4 (with solutions)

Full Name: _____

On my honor, I have neither given nor received unauthorized aid on this quiz

Signature: _____

This is a 10 minute quiz. There are 5 multiple choice problems, each having EXACTLY ONE correct answer. You may *not* use any books, other references, or text-capable electronic devices.

1. Let X be the number of heads obtained in 40 independent tosses of a fair coin. Then X is a Binomial random variable with
 - (a) $n = 40, p = 0$.
 - (b) $n = 0.5, p = 40$.
 - (c) $n = 40, p = 0.5$.
 - (d) $n = 100, p = 0$.

Correct answer (c): $n =$ Number of repetitions $= 40, p =$ probability of success in a single repetition $= 0.5$.

2. An experiment consists of repeatedly and independently tossing a fair die until a six is obtained. Let X denote the number of throws *before* obtaining a six. Then
 - (a) $E[X] = 5$.
 - (b) $E[X] = \frac{1}{6}$.
 - (c) $E[X] = 1$.
 - (d) $E[X] = 6$.

Correct answer (a): X is Geometric($\frac{1}{6}$). Hence, $E[X] = \frac{1-1/6}{1/6} = 5$.

3. What is the range of a Geometric random variable?
 - (a) All integers.
 - (b) All positive integers.
 - (c) All non-negative integers.
 - (d) All negative integers.

Correct answer (c): Non-negative integers include 0, positive integers do not.

4. A *large* collection of tires has 3% defective tires. Suppose one chooses tires from this collection until he/she obtains 4 non-defective tires. Then the total number of defective tires drawn in this process has a Negative Binomial distribution with
 - (a) $r = 3, p = 0.04$.

(b) $r = 4, p = 0.97$.

(c) $r = 3, p = 0.97$.

(d) $r = 4, p = 0.03$.

Correct answer (b): $r =$ Total number of successes $= 4, p =$ Probability of success $= 1 - 0.03 = 0.97$.

5. A Negative Binomial(r, p) random variable can be expressed as a sum of r Geometric(p) random variables. This statement is

(a) True.

(b) False.

Correct answer (a) (see lecture notes).