RESULTS

- **True** **74%**
- **Not true** **26%**

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Results gathered from 159 respondents.

FEEDBACK

False. For example, if (X) and (Y) have the same success probability, (X+Y) will follow a negative-binomial distribution.

1

0 points possible (ungraded)

In a basketball shooting workout, a player keeps shooting until she makes 10 baskets. Suppose the probability that she makes any given shot is 0.7, and let X be the total number of shots she takes. Calculate:

- $E\left[X\right]$,

41

✖ **Answer:** 100/7

41

Explanation

Let X_i be the random variable indicating the number of shots between the $(i-1)^{th}$ and i^{th} shots $(i \in \{1, \ldots, 10\})$ Then, the total number of shots, $T = \sum_{i=1}^{10} X_i$. Using the fact that here each of the random variables $X_i \sim \text{Geometric}\,(0.7)$, and that for a geometric distribution with parameter p, $E\left(X_i\right) = 1/p\, E\left(X_i\right) = 1/0.7 = 10/7$. Further, by linearity of expecatation $E\left(T\right) = \sum_{i=1}^{10} E\left(X_i\right) = 100/7$.

- $V\left(X\right)$.

✖ **Answer:** 300/49

Explanation

Using that $X_i \sim \text{Geometric}\,(0.7)$, and that for a geometric distribution with parameter p, $V\,(X_i) = (1-p)\,/p^2\,V\,(X_i) = 0.3/0.49 = 30/49$Here, each of the X_i, $(i \in \{1,\ldots,10\})$ are also independent. Thus $V\,(T) = \sum_{i=1}^{10} V\,(X_i) = 300/49$

Submit You have used 4 of 4 attempts

Answers are displayed within the problem

2

2.0/2.0 points (graded)

A production line has a 5% defective rate, and its products are inspected one-by-one until the first defect is found. Given that the first 10 inspections do not find any defect, what is the probability that the number of inspections is at most 20?

0.401263060 ✔

0.401263060

Submit You have used 2 of 3 attempts

3

2.0/2.0 points (graded)

A bag contains K blue balls and $N-K$ red balls. Find the expected number of blue balls observed when n balls are randomly drawn. Does the answer depend on whether the selection is with or without replacement?

- (selected) $n\frac{K}{N}$ ✔
- $(n-1)\,\frac{K}{N}$
- $(n-1)\,\frac{K-1}{N-1}$
- $(n)\,\frac{K-1}{N-1}$

Submit You have used 1 of 2 attempts

4

0 points possible (ungraded)

A bag contains 6 blue balls and 9 red balls, if 5 balls are randomly picked from the bag with replacement, what is the most likely number of blue balls that will be picked?

6 ✖ **Answer:** 2

6

Explanation

Intuitively, it is most likely to get 2 blue balls and 3 red balls.

Let X be the number of blue balls. $P(X = k) = \frac{\binom{6}{k}\binom{9}{5-k}}{\binom{15}{5}}$, and we can show that it reaches its maximum when $k = 2$.

Submit You have used 4 of 4 attempts

Answers are displayed within the problem

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