2. A three-sided die

Problem 2. A three-sided die, part 1

1.0/1.0 point (graded)

The newest invention of the 6.431x staff is a three-sided die. On any roll of this die, the result is 1 with probability 1/2, 2 with probability 1/4, and 3 with probability 1/4.

Consider a sequence of six independent rolls of this die.

Find the probability that exactly two of the rolls result in a 3.

- $\binom{6}{2}\left(\frac{1}{4}\right)^2\left(\frac{3}{4}\right)^4$ ✔
- $\binom{6}{2}\left(\frac{1}{4}\right)^2$
- $\binom{6}{2}\left(\frac{1}{4}\right)^2\binom{6}{4}\left(\frac{3}{4}\right)^4$
- $\binom{6}{2}\left(\frac{1}{4}\right)^4\left(\frac{3}{4}\right)^2$

Solution:

Each roll is an independent trial with probability 1/4 of resulting in a 3 (a “success""). The probability of exactly 2 successes in 6 trials is given by the binomial probabilities, with $n = 6$, $k = 2$, and $p = 1/4$:

$$\binom{6}{2}\left(\frac{1}{4}\right)^2\left(\frac{3}{4}\right)^4$$

提交 You have used 1 of 2 attempts

Answers are displayed within the problem

Problem 2. A three-sided die, part 2

3.0/3.0 points (graded)

1. Given that exactly two of the six rolls resulted in a 1, find the probability that the first roll resulted in a 1.
Note: Your answer should be a number. Do not enter "!" or combinations in your answer.

1/3 ✔

2. We are told that exactly three of the rolls resulted in a 1 and exactly three rolls resulted in a 2. Given this information, find the probability that the six rolls resulted in the sequence $(1,2,1,2,1,2)$.
Note: Your answer should be a number. Do not enter "!" or combinations in your answer.

1/20 ✔

3. The conditional probability that exactly k rolls resulted in a 3, given that at least one roll resulted in a 3, is of the form:

$$\frac{1}{1-(c_1/c_2)^{c_3}}\binom{c_3}{k}\left(\frac{1}{c_2}\right)^k\left(\frac{c_1}{c_2}\right)^{c_3-k}, \quad \text{for } k=1,2,\ldots,6.$$

Find the values of the constants c_1, c_2, and c_3:

$c_1 =$ 3 ✔

$c_2 =$ 4 ✔

$c_3 =$ 6 ✔

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讨论

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