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Problem 4: A three-sided die

(4/4 points)

The newest invention of the 6.041x 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.

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

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

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

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

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

2. 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.

 ✓

3. 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.



4. 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:

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

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

$c_1 =$



$c_2 =$



$c_3 =$



You have used 1 of 2 submissions

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