



PROBABILITY ASSIGNMENT

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1 problem

The Expectation of X=Mean of the variable X

Two dice are thrown simultaneously. If X denotes the number of sixes, find the expectation of X.

$$E(X) = \mu = \sum_{i=1}^n x_i P(x_i) \quad (4)$$

2 solution

consider each trial results in success (getting six on a dice) or failures (not getting sixes on dices)

so,

X may have value 0,1, or 2

Total number of possible outcomes = 36

number of outcomes n = 2

when a two dice are rolled once,

$$\mu = 0 \times {}^2C_0 \left(\frac{5}{6}\right)^2 + 1 \times {}^2C_1 \left(\frac{5}{36}\right) + 2 \times {}^2C_2 \left(\frac{1}{6}\right) \quad (5)$$

$$\text{Mean of X} = \mu = \frac{1}{3} \quad (6)$$

$$\text{probability (P)} = \frac{1}{6} \quad (1)$$

so ,

$$q = 1 - P = 1 - \frac{1}{6} = \frac{5}{6} \quad (2)$$

In Bernoulli trials with X success and (n-x) failures, the probability of x success in n Bernoulli trials can be given as ,

$${}^nC_x P^x q^{n-x} \quad (3)$$

Therefore, The required probability distribution as follows

X	0	1	2
P(X)	${}^nC_0 P^0 q^n$	${}^nC_1 P^1 q^{n-1}$	${}^nC_2 P^2 q^{n-2}$
P(X)	${}^2C_0 \left(\frac{5}{6}\right)^2$	${}^2C_1 \left(\frac{5}{36}\right)$	${}^2C_2 \left(\frac{1}{6}\right)$