Indian Institute of Technology Hyderabad

PROBABILITY ASSIGNMENT

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1 Problem

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

2 Solution

Consider each trial results in success(getting six on a dices) or failures (not getting sixes on disces)
so,
X may have value 0,1,or 2
total number of possible outcomes = 12
number of outcomes n =2
when a two discs are rolled Once,

$$\text{Probability (p)} = \frac{1}{6} \tag{1}$$

so ,

$$q = 1 - p = 1 - \frac{1}{6} = \frac{5}{6} \tag{2}$$

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

$$^{n}C_{x}P^{x}q^{n-x} \tag{3}$$

Therefore,the required probability distribution as follows

X	0	1	2
P(X)	$^{n}C_{0}P^{0}q^{n}$	$^{n}C_{1}P^{1}q^{n-1}$	$^{n}C_{2}P^{2}q^{n-2}$
P(X)	$^{2}C_{0}(\frac{5}{6})^{2}$	$^{2}C_{1}(\frac{5}{36})$	$^{2}C_{2}(\frac{1}{6})$

The expectation of X = mean of the variable X

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

$$\mu = 0 \times^{2} C_{0}(\frac{5}{6})^{2} + 1 \times^{2} C_{1}(\frac{5}{36}) + 2 \times^{2} C_{2}(\frac{1}{6}) \tag{5}$$

$$\text{mean of X} = \mu = \frac{1}{3} \tag{6}$$