Probability Assignment 1 (12.13.5.2)

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Question

A pair of dice is thrown 4 times. If getting a doublet is considered a success, find the probability of two successes.

Solution

Let X denote the number of doublets/successes obtained after the 4 trials. Clearly, X has the binomial distribution with $n = 4$ and p being the probability of obtaining a doublet,

$$p = \frac{6}{36} \tag{1}$$

$$= \frac{1}{6} \tag{2}$$

Now, since X has the binomial distribution, the probability mass function is given by

$$P_X(r) = {}^{n}C_r \left(\frac{1}{6}\right)^r \left(\frac{5}{6}\right)^{n-r} \tag{3}$$

Hence, the probability of two successes is

$$P_X(2) = {}^{4}C_2 \left(\frac{1}{6}\right)^2 \left(\frac{5}{6}\right)^2 \tag{4}$$

$$= \frac{25}{216} \tag{5}$$