

Assignment-1

EE22BTECH11013-Premsagar

Question 12.13.6.7 : A die is thrown again and again until three sixes are obtained. Find the probability of obtaining third six on sixth throw of a die.

Solution: Let E the event be getting third six on sixth throw

Binomial pmf given by,

$$\Pr(X = k) = {}^nC_k p^k (1 - p)^{n-k}$$

probability of getting two sixes in first five throws,

TABLE 0
PARAMETERS FOR PMF

parameter	value
n	5
p	$\frac{1}{6}$
k	2
$1 - p$	$\frac{5}{6}$

$$\Pr(k = 2) = {}^5C_2 \left(\frac{1}{6}\right)^2 \left(1 - \frac{1}{6}\right)^{5-2} \quad (1)$$

$$= {}^5C_2 \left(\frac{1}{6}\right)^2 \left(\frac{5}{6}\right)^3 \quad (2)$$

$$= \frac{10 \times 5^3}{6^5} \quad (3)$$

$$= \frac{1250}{7776} \quad (4)$$

Now,

$$\Pr(E) = p \cdot \Pr(k = 2) \quad (5)$$

$$= \frac{1}{6} \times \frac{1250}{7776} \quad (6)$$

$$= 0.026 \quad (7)$$

Hence, probability of getting third six on sixth throw of a die is 0.026