

AI1110 Assignment-2

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Abstract—This document provides the solution to question 7 in Chapter 13 of the 12th grade NCERT textbook, Exercise 13.6.

Question :

A die is thrown again and again until three sixes are obtained. Find the probability of obtaining the third six in the sixth throw of the die.

Solution :

Parameter	Value	Description
p	$\frac{1}{6}$	Probability that number 6 occurs on the die
q	$\frac{5}{6}$	Probability that number 6 doesnot occurs on the die

TABLE 0
GIVEN INFORMATION

Let X be a random variable that represents the minimum no.of times the dice need to be thrown such that three sixes occurs.

And Y be a random variable that represents no.of sixes on throwing the dice five times.

Random variable Y follows binomial distribution.

$$\Pr(Y = k) = \binom{n}{k} p^k (q)^{n-k} \quad (1)$$

We need to find the probability that the third six is obtained in the sixth throw of the dice i.e $\Pr(X = 6)$

It implies that two sixes are obtained in the first five throws of the dice.

$$\begin{aligned} &\Pr(\text{getting 3rd six in 6th throw}) = \\ &\Pr(\text{getting 2 sixes in 5 throws}) \\ &\times \Pr(\text{getting a six in 6th throw}) \end{aligned}$$

$$\Rightarrow \Pr(X = 6) = \Pr(Y = 2) \times \frac{1}{6} \quad (2)$$

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

$$= 10 \times \frac{5^3}{6^6} \quad (4)$$

$$\approx 0.027 \quad (5)$$