

ASSIGNMENT-14

R.YAMINI

1 QUESTION No-6.19(PROBABILITY)

A die is thrown. If E is the event "the number appearing is a multiple of 3" and F be the event "the number appearing is even" then find whether E and F are independent ?

2 SOLUTION

Lemma 2.1. *The conditional probability $\Pr(A|B)$ equals $\Pr(A)$ for independent events.*

Let the random variable representing the events be $X \in \{0, 1\}$, where

X	0	Number appearing is a multiple of 3
	1	Number appearing is even

From the given information we have,

$$\Pr(X = 0) = \frac{1}{3} \quad (2.0.1)$$

$$\Pr(X = 1) = \frac{1}{2} \quad (2.0.2)$$

$$\Pr(X = 0, X = 1) = \frac{1}{6} \quad (2.0.3)$$

Now to check whether the events are independent we use Lemma (2.1)

$$\Pr(X = 0|X = 1) = \frac{\Pr(X = 0, X = 1)}{\Pr(X = 1)} = \frac{1}{3} \quad (2.0.4)$$

$$= \Pr(X = 0) \quad (2.0.5)$$

Thus $\Pr(X = 0|X = 1) = \Pr(X = 0)$ which implies the events are independent.