ASSIGNMENT-14

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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 $X \in \{0, 1, 2\}$,where

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

From the given information we have,

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

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

$$Pr(X = 2) = \frac{1}{6} \tag{2.0.3}$$

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

$$Pr(X = 0|X = 1) = \frac{Pr(X = 2)}{Pr(X = 1)} = \frac{1}{3} \tag{2.0.4}$$

$$= Pr(X = 0) \tag{2.0.5}$$

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