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Probability

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Assignment-I

13.2.5 [1] A die marked 1, 2, 3 in red and 4, 5, 6 in green is tossed. Let A be the event, the number is even, and B be the event,the number is red . Are A and B independent?

Solution: Let $X \in \{0,1\}$ where 0 denotes the number is Red and 1 denotes that the number is Green. Let $Y \in \{0,1\}$ where 0 denotes the number is Even and 1 the number is Odd.

From the given information,

Random Variables	**Values**
X=0	Number is Red = {1,2,3}
X=1	Number is Green = {4,5,6}
Y=0	Number is Even = {2,4,6}
Y=1	Number is Odd = {1,3,5}

Table 13.2.5.2: Random variables X and Y

Pr(Events)	**Values**
Pr(X=0)	(1/2)
Pr(Y=0)	(1/2)
Pr(0,0)	(1/6)

Table 13.2.5.4: Probability of events X and Y

The two events are said to be independent if,

$$\Pr(0,0) = \Pr(X=0)\,.\,\Pr(Y=0) \tag{13.2.5.1}$$

$$\left(\frac{1}{6}\right) \neq \left(\frac{1}{2}\right)\left(\frac{1}{2}\right) \tag{13.2.5.2}$$

$\therefore$ Therefore, the events are not independent.

[1] Read question numbers as (CHAPTER NUMBER).(EXERCISE NUMBER).(QUESTION NUMBER)