ASSIGNMENT-12

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1 QUESTION No-6.16

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 ?

2 Solution

Lemma 2.1. *Two events A and B are said to be independent if and only if P(A ∩ B)=P(A)P(B).*

The description of events is given in table 2.1

Events	Description
A	The Number appearing on die is even
B	The Number appearing on die is marked in red.
A ∩ B	Number appearing is even and marked in red

TABLE 2.1: Description of Events

When a die is thrown the possibilities are $S = \{1, 2, 3, 4, 5, 6\}$ and for the events A and B we have,

$$A = \{2, 4, 6\} \implies P(A) = \frac{1}{2} \tag{2.0.1}$$

$$B = \{1, 2, 3\} \implies P(B) = \frac{1}{2} \tag{2.0.2}$$

$$A \cap B = \{2\} \implies P(A \cap B) = \frac{1}{6} \tag{2.0.3}$$

$$P(A) \times P(B) = \frac{1}{4} \tag{2.0.4}$$

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

$$P(A) \times P(B) \neq P(A \cap B) \tag{2.0.5}$$

Thus A and B are not independent.