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(AB)=P(A)P(B).*

When a die is thrown the possibilities are $S = \{1, 2, 3, 4, 5, 6\}$.Based on this the description of events are given in table 2.1

Event	Description
A	A={2,4,6}
B	B={1,2,3}
AB	AB={2}

TABLE 2.1: Description of Events

The probabilities of the various events are as follows.

$$P(A) = \frac{1}{2} \qquad (2.0.1)$$

$$P(B) = \frac{1}{2} \qquad (2.0.2)$$

$$P(AB) = \frac{1}{6} \qquad (2.0.3)$$

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

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

$$P(A) \times P(B) \neq P(AB) \qquad (2.0.5)$$

Thus A and B are not independent.