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. *Two events A and B are said to be independent if* $P(A \cap B) = P(A)P(B)$.

From the given information we have,

Events	Description
E	Number appearing is a multiple of 3
F	Number appearing is even
E$\cap F$	Number appearing is even and multiple of 3

When a die is thrown we have the possibilities to be $S = \{1, 2, 3, 4, 5, 6\}$ and for the events E and F we have,

$$E = \{3, 6\} \implies Pr(E) = \frac{1}{3} \tag{2.0.1}$$

$$F = \{2, 4, 6\} \implies Pr(F) = \frac{1}{2} \tag{2.0.2}$$

$$E \cap F = \{6\} \implies Pr(E \cap F) = \frac{1}{6} \tag{2.0.3}$$

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

$$Pr(E \cap F) = Pr(E)Pr(F) = \frac{1}{6} \tag{2.0.4}$$

Thus the events are independent.