Probability, Exercise 16.3, Q5

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Outline

Question

A fair coin with 1 marked on one face and 6 on the other and a fair die are both tossed. Find the probability that the sum of the numbers that turn up is

o 3

o 12

Solution:

The coin can turn up either 1 or 6 only, where as die can turn up 1, 2, 3, 4, 5, 6

As well as the coin and the die both are fair, hence the chance of getting any number is equally probable for both coin and die.

i.e.,

$\Pr(A_i) = \frac{1}{2}$, where i = 1, 6;

$\Pr(A_i) = \frac{1}{6}$, where i = 1, 2, 3, 4, 5, 6;

And these two are indenpendent events, hence we can say,

$$\Pr(AB) = \Pr(BA) = \Pr(A)\Pr(B) \tag{1}$$

where we can assume A as event of tossing coin and B is event of tossing die

Sum of numbers turned up is 3

Since the coin can show only 1 or 6, the case of getting sum is possible only when coin turned up 1 and die turned up 2

Hence the Probability of getting sum of numbers that turned up as 3 is given by as follows,

$$\Pr(A_1 B_2) = \Pr(A_1) \Pr(B_2) \tag{2}$$

$$= \frac{1}{2} \times \frac{1}{6} \tag{3}$$

$$= \frac{1}{12} \tag{4}$$

Hence the required probablility is $\frac{1}{12}$

Sum of numbers turned up is 12

Since the coin can show only 1 or 6, the case of getting sum is possible only when coin turned up 6 and die turned up 6

Hence the Probability of getting sum of numbers that turned up as 12 is given by as follows,

$$\Pr(A_6 B_6) = \Pr(A_6) \Pr(B_6) \tag{5}$$

$$= \frac{1}{2} \times \frac{1}{6} \tag{6}$$

$$= \frac{1}{12} \tag{7}$$

Hence the required probablility is $\frac{1}{12}$