

Probability, Exercise 16.3, Q5

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- 3 Sum of numbers turned up is 12:

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.,

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

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

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

$$\Pr(A|B) = \Pr(B|A) = \Pr(A) \Pr(B)$$

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,

$$\begin{aligned}\Pr(A = 1|B = 2) &= \Pr(A = 1) \Pr(B = 2) \\ &= \frac{1}{2} \times \frac{1}{6} \\ &= \frac{1}{12}\end{aligned}$$

Hence the required probability 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,

$$\begin{aligned}\Pr(A = 6|B = 6) &= \Pr(A = 6) \Pr(B = 6) \\ &= \frac{1}{2} \times \frac{1}{6} \\ &= \frac{1}{12}\end{aligned}$$

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