EE23010 NCERT Exemplar

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Question 12.13.3.2
A fair die is thrown two times. Let A and B be the events, 'same number each time', and a 'a total score is 10 or more', respectively. Determine whether or not A and B are independent.
Solution:

Event	Description
A	Getting same number each time.
B	Getting a total score of atleast 10.

For two events A and B to be independent,

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

$$\Pr(A) = \frac{6}{36} \tag{2}$$

Let n be the sum of numbers appearing on the dice,

$$\Pr(B = n) = \begin{cases} 0, n < 1 \\ \frac{n-1}{36}, 2 \le n \le 7 \\ \frac{13-n}{36}, 7 \le n \le 12 \\ 0, n > 12 \end{cases} \tag{3}$$

In this case, n can be 10, 11 or 12

$$\Pr(B) = \frac{3}{36} + \frac{2}{36} + \frac{1}{36} \tag{4}$$

$$= \frac{6}{36} \tag{5}$$

$$\Pr(AB) = \frac{2}{36} \tag{6}$$

$$\Pr(A)\Pr(B) = \frac{6}{36} \times \frac{6}{36} \tag{7}$$

$$= \frac{1}{36} \tag{8}$$

Thus,

$$\Pr(A)\Pr(B) \neq \Pr(AB) \tag{9}$$

$$\frac{1}{36} \neq \frac{2}{36} \tag{10}$$

Hence A and B are not independent events.