

Basic Probability: Key Definitions and Rules

Two events are **dependent** if knowing that one will occur (or has occurred) changes the probability that the other occurs.

E.g. Event A: The roll of a die is odd (1, 3, 5);

Event B: The roll of a die is 1.

Event A and Event B are dependent.

The **conditional probability of the event A, given that the event B has occurred or will occur**, is the long-run relative frequency with which event A occurs when circumstances are that B has occurred or will occur. It is written as $P(A/B)$.

E.g. Event A: The roll of a die is odd (1, 3, 5);

Event B: The roll of a die is not 1.

$P(A/B)$, or the probability of Event A given B means that given

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To find the probability that two events, A and B, both occur simultaneously or in a sequence:

Rule 3a (general): $P(A \text{ and } B) = P(A)P(B|A) = P(B)P(A|B)$

Rule 3b (for independent events): If A and B are independent events,

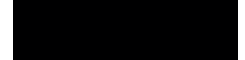
$$P(A \text{ and } B) = P(A)P(B)$$

E.g. Event A: Roll a die, and the outcome is 1; $P(A) = 1/6$

Event B: Roll another die simultaneously, and the outcome is also 1. $P(B) = 1/6$

Because Event A and Event B are independent, $P(A \text{ and } B)$ (meaning that roll two dice simultaneously, and both outcomes are 2) = $1/6 * 1/6 = 1/36$

Extension of Rule 3b to more than two independent events:



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Rule 4 (conditional probability):

