

Probability of Complementary Event

Complementary Events

Definition 1: Two events A and B of the same experiment E are said to be complementary if either one of them (but not both) must happen in any single run of the experiment E. More precisely, A and B are complementary if

$$A \cup B = \text{empty set} \quad \text{and} \quad A \cap B = \text{Sample space of E}$$

Example 1: Let E be the experiment of randomly picking a whole number bigger than 1. Let A be the event of picking a prime number, and B be the event of picking a composite number. Then the two events A and B are complementary because any whole number bigger than 1 must be either prime or composite but not both.

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Definition 2: If A and B are complementary events in the same experiment E, then

$$P(A) + P(B) = 1$$

Consequently, if we know $P(A)$, we can easily compute $P(B)$.