

1. The probability that event E will not happen is $P(E')$. Since event E either happens or does not happen, $P(E) + P(E') = 1$, so $P(E') = 1 - P(E)$.
2. The probability that event E or event F happens is $P(E \cup F)$.
3. The probability that event E and event F both happen is $P(E \cap F)$.
4. Addition Principle for Probability: $P(E \cup F) = P(E) + P(F) - P(E \cap F)$.
5. Two events E and F are said to be **mutually exclusive** if $P(E \cap F) = 0$. In this case, the addition principle for probability becomes $P(E \cup F) = P(E) + P(F)$.

Exercises

1. A fair pair of dice is rolled. Let E = “the sum of the number of dots face up is 8,” let F = “the sum of the number of dots face up is five,” and let G = “the number of dots face up on each die is the same.” Find

(a) $P(E)$	(d) $P(E \cap G)$
(b) $P(E')$	(e) $P(E \cup G)$
(c) $P(G)$	(f) $P(F \cap G)$

(g) Are events E and G mutually exclusive? Why or why not?

(h) Are events F and G mutually exclusive? Why or why not?

2. In a group of 50 foreign language students, 30 speak French, 36 speak Spanish, and 20 speak both. A person is selected at random from this group. What is the (empirical) probability that the person

(a) Does not speak Spanish

(b) Speaks French or Spanish

(c) Speaks French but not Spanish



3. Data given in the form of a table can be used to answer questions about probability. For all of these questions, you can use the formula $P(E) = \frac{n(E)}{n(S)}$.

The table below gives the distribution of blood type by gender.

Blood Type	Male	Female	TOTAL
O	40	185	225
A	75	125	200
B	25	25	50
AB	10	15	25
TOTAL	150	350	500

A person is selected at random from this group. What is the (empirical) probability that the person selected

(a) is a female	(e) has blood type O or blood type A
(b) has blood type AB	(f) has blood type A
(c) is a female with blood type AB	(g) does not have blood type A
(d) is a female or has blood type AB	(h) is a female who does not have blood type A

4. The current composition of the U.S. House of Representatives is 233 Democrats and 201 Republicans (with one vacancy). If 4 Representatives are chosen at random to serve on a committee, what is the probability that the committee contains at least one Democrat?

Hint: First find the probability that the committee contains no Democrats. How can you then find the probability that the committee contains at least one Democrat?