Section 4.2 — Addition

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Complementary Events

Addition

Complementary Events

Definition

The complement of event *A*, denoted A^C, consists of all possible outcomes in which *A* does *not* occur.

Example

- Choose a red card out of a deck of cards.

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- Roll two six-sided dice and the sum is even.

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- Roll two six-sided dice and the sum is even.
- At least two people in this class share a birthday

Rule of Complements

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$$P(A) + P(A^C) = 1$$

Addition

Notation

$P(A \text{ or } B) = P(A \cup B)$ is the probability that A, B, or both occur in a single trial.

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$P(A \text{ and } B) = P(A \cap B)$ is the probability that both A and B occur in a single trial.

Drug Screening

Table 1: Results of a certain drug screening

	Positive Result	Negative Result
Used drugs	44	6
Not a Drug User	90	860

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1. Let *A* be the event that the person used drugs and *B* be the event that there was a negative test result.

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	Positive Result	Negative Result
Used drugs	44	6
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1. Let A be the event that the person used drugs and B be the event that there was a negative test result.
2. What is the probability someone was not a drug user or had a positive test result?

Civil Rights Act of 1964

Table 2: Civil Rights Act of 1964 Votes

	Yes	No
Democrats	152	96
Republicans	138	34

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Question

What is the probability that selected congressman is a Democrat or voted yes?

Addition Rule

Theorem (Addition rule)

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Dice

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1. What's the probability the sum is a 4 or an 8?
2. What's the probability the sum is a 4 or both dice are the same?

Mutually exclusive events

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> Two events are mutually exclusive if they have no outcomes in common.

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Definition (Mutually exclusive events)

Two events are mutually exclusive if they have no outcomes in common.

Mutually Exclusive Rule

If E and F are two mutually exclusive events, then

$$P(E \text{ or } F) = P(E) + P(F)$$

Breakdowns

In a survey of consumers aged 12 and older, respondents were asked how many cell phones were in use in their household. (No two respondents were from the same household). These are the results of the survey.

Number of cell phones	Number who responded
None	221
One	290
Two	378
Three	146
Four or more	122