

Discrete Mathematics

Logic and Proof

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Propositions and Operations

Propositions

- › **Proposition.** A proposition is a statement that is either true or false.
 - Propositions are typically declarative sentences.
 - A proposition's *truth value* is a value indicating whether the proposition is actually true or false.

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- › **Example.** Determine if each of the following is a proposition.
 1. 10 is a prime number.
 2. Would you like some cake?
 3. The movie was funny.
 4. Meet me at 5 pm tomorrow.
 5. Stop or I will shoot!

Operations

- › A **compound proposition** is created by connecting individual propositions with logical operations.
 - A **logical operation** combines propositions using a particular composition rule.

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Conjunction (“and”) $p \wedge q$

- › Truth table.
- › Translation in English.

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Disjunction (“or”) $p \vee q$

- › Truth table.
- › Translation in English.

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Exclusive-or (“xor”) $p \oplus q$

- › Truth table.
- › Translation in English.

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Negation (“not”) $\neg p$

- › Truth table.
- › Translation in English.