### Definition: Disjunction

Let A ∨ BA ∨ BAB and B be statements. The disjunction (also called or-operator or or-connective) of A ∨ B A OR B A B A

and is written as or . This is read “ or .”

is true if at least one of the two statements is true. Only if both statements are false is also false. Let D :=A := “7 is an even number,” B := “3 is greater than 4,” A B C := “7 is an odd number,” andC D

#### Example: Disjunction

“4 is greater than 3.” Then statements and are false and statements and are

A ∨ CA ∨ B is wrong because both A and B are wrong. C true. is true, however, because at least one of the two statements, namely , is true.

C ∨ D is also true, because in this propositional logical formula all statements that occur are true.

NOT A¬ALet A be a statement. The negation (also called not-operator ) of A A A. A A is written as ¬A or Definition: Negation

or . This is read “not ”

is true exactly when is false and false exactly when is true.

Let A := “7 is an even number” and D A D := “4 is greater than 3.” Then statement ¬D A is falseD Example: Negation

¬A is therefore true because is a false statement. Accordingly, is false because is a and statement is true. true statement.

Let A and B B be statements. The implication (also called if-then-operator or subjunction) ofA ⇒ B A A B A ⇒ BB A B Definition: Implication

and is written as . It is read “ implies .”

A ⇒ B is false exactly when (and only when) A B is true and is false (because a true state-

ment cannot be followed by a false statement). In every other case, that is, if and are both true, or if is false and is either true or false, is true. The latter is based on the fact that everything (i.e., both a true and a false statement) can follow from a false In common literature, the symbol → is often used for the implication instead of ⇒. Both statement. signs mean the same thing. We use the second option.

Let A := “7 is an even number,” B := “3 is greater than 4,” A B C := “7 is an odd number,” andC D Example: Implication

D := “4 is greater than 3.” Then statements and are false and statements and are The implication A ⇒ B is true because A ⇒ CC ⇒ AA is a false statement and from such a statementC A true.

everything can follow. Accordingly, would also be true.

On the other hand, the implication is false, because is a true statement and is C ⇒ D is true because both C and D are true.

a false statement, but a true statement must never be followed by a false one.

This example illustrates once again that we are at first actually only interested in the truth content of a statement, but not in its content. This is irrelevant when considering whether a propositional logical formula is true or false.