

TOPIC: STATEMENTS AND NEGATIONS

Chapter Resource: Logical Definitions and Symbols

Term	Symbol	Definition	Example
Statement	p, q, r	A sentence that has a truth value (True or False, not both)	p : It is raining outside today.
Negation	$\sim$	The negation of a statement is its opposite and has the opposite truth value.	p : It is raining outside today. $\sim p$: It is not raining outside today.
Quantifier		A term that indicates amount .	Universal Quantifiers: All, No, None, Every, Each, etc. Existential Quantifiers: Some, There exists, At least one
Categorical Statement		A statement with a quantifier . Sometimes called a quantified statement.	Some animals are birds. All seagulls are birds.
Conjunction	$\wedge$	A compound statement that combines two statements with the word ' and .'	I took the test and I passed. $p \wedge q$
Disjunction	$\vee$	A compound statement that combines two statements with the word ' or .'	I have a cat or I have a dog. $p \vee q$
Conditional Statement	$\rightarrow$	A compound statement where one statement causes , or implies , the other. Often combined with " if...,then... "	If I go to the movies, then I'll get popcorn. $p \rightarrow q$
Antecedent	p in $p \rightarrow q$	The 'condition' or ' if ' part of a conditional statement.	If I go to the movies , then I will buy popcorn.
Consequent	q in $p \rightarrow q$	The 'consequence' or ' then ' part of a conditional statement.	If I go to the movies, then I will buy popcorn .
Equivalent Statements	$\equiv$ or $\cong$	Two statements are equivalent if they always have the same truth values .	$p \rightarrow q$, and $\sim p \vee q$.

TOPIC: STATEMENTS AND NEGATIONS

Statements and Negations

◆ A **Statement** (proposition) is a sentence with a **truth value**: it is either _____ or _____, but not both.

► We use lowercase letters like _____ to represent statements symbolically.

EXAMPLE

Determine whether each sentence is a statement and, if so, determine its truth value.

(A) A group of lions is a pride.

[YES | NO]

(B) Don't forget to feed the parakeet.

[YES | NO]

(C) The best animals are zebras.

[YES | NO]

(D) Koalas are not marsupials.

[YES | NO]

◆ The **Negation** of a statement is its _____ and has the opposite truth value.

► We use $\sim$ or $\neg$ to represent a negation, so the negation of p is _____ and we read it as _____.

EXAMPLE

Find the negation of each statement and determine its truth value.

(A) p : A group of lions is a pride.



____: A group of lions _____ a pride.

(B) q : Koalas are not marsupials.



____: Koalas _____ marsupials.

PRACTICE

Determine if the following is a statement.

(A) The city library closes at 8 PM tonight.

[YES | NO]

(B) $8 - 6 = 3$

[YES | NO]

(C) $x = 5$

[YES | NO]

(D) This sentence is false.

[YES | NO]

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PRACTICE

Find the truth value of the following statements.

(A) $2 < 5$

(B) Squares are not polygons.

PRACTICE

Let p : You submit your assignment early. q : You get full credit on the assignment. Write the following in symbolic form.

(A) You do not get full credit on the assignment.

(B) It is not true that you submit the assignment early.

PRACTICE

Take the statement and find its negation.

(A) p : Today is cold.

(B) q : The library does not loan out reference books.

(C) r : $2 + 5 = 7$

(D) s : I haven't gone to the store today.