A <u>statement</u> is either true or false.
Examples:

1) Six is an integer. T
2) π is an integer. F
3) All integers are real numbers. T
4) All real numbers are integers. F
5) Some real numbers are integers. T

"Some" = "at least one"

Non-examples:

1) Do your homework.
2) Did you do your homework?

Ambiguous statement example:
Pizza is good.

CONNECTIVES

Colloquial Term	Symbol	Technical Term
not	~	negation
and	$\wedge$	conjunction
or	$\vee$	disjunction
if….then	$\Rightarrow$	conditional
if and only if	$\Leftrightarrow$	biconditional

NEGATIONS
Find the negation of the following statements.

The negation of a statement
is the statement itself.
$$\sim(\sim s) = s$$

1) s: My cat has three ears.
   ~s: My cat does not have 3 ears.

2) s: All dogs are black.
   ~s: Not all dogs are black.   ~s: Some dogs are not black.

3) s: Some quadrilaterals have exactly three sides.
   ~s: All quadrilaterals do not have exactly 3 sides.   ~s: No quadrilaterals have exactly 3 sides.

4) p: My hair is brown. q: My eyes are blue.
   ~p: My hair is not brown   ~q: my eyes are not blue

   ~$(p \wedge q)$: I do not have both brown hair and blue eyes

   ~$p \vee \sim q$: My hair is not brown or my eyes are not blue

   ~$(p \vee q)$: I don't have either brown hair or blue eyes

   ~$p \wedge \sim q$: My hair is not brown and my eyes are not blue

   $p \rightarrow q$: If my hair is brown then my eyes are blue

   $p \Leftrightarrow q$

Logically equivalent
De Morgan's Laws

~(p ∧ q)

My hair is not brown or my eyes are not blue • 🙂

My hair is not brown and my eyes are not blue 😟

I do not have both brown hair and blue eyes 🙂

$p \lor q$: my hair is brown or my eyes are blue

$\sim(p \lor q)$? : ~~my hair is not brown or my eyes are not blue~~

I do not have brown hair or blue eyes ←

✳ → My hair is not brown and my eyes are not
blue

✳ I don't have either brown hair or blue eyes ←

almost the same,
"either" is more clear

$\sim (p \lor q) \rightarrow p$

p	q	$p \lor q$ (or)	$\sim (p \lor q)$	$\sim (p \lor q) \rightarrow p$
T	T	T	F	T
T	F	T	F	T
F	T	T	F	T
F	F	F	T	F