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OH 2  
11:05



Start Quiz 1 !!  
post questions  
&  
help each other  
on teams!

Questions ?!

Ask away!

conditional statement is a specific thing

open sentence = "almost a statement"  
= "pre-statement"

= a sentence whose truth value does  
not exist until you plug in variables

ex]  $x^2 \geq 0$  open sentence

$0 \geq 0$  true

$44 \geq 0$  true

$\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}^2 \geq 0$  ??? false

Casey is tall. False

ex) He is tall.  
↑  
variable

**Example 1.3.** The sentence " $\cos(\theta) = 1$ " is an *open sentence*.

The sentence " $t + 3 > 7$ " is an *open sentence*.

The sentence "She is 6 feet tall." is an *open sentence*. (What is the "variable" in this open sentence?)

"she" is the variable

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Conditional Statement (if-then)

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$P, Q$

if  $P$  then  $Q$

$P \Rightarrow Q$  ( $P \rightarrow Q$  alt. notation)

Vacuously True

a conditional statement where  $P$  is false

$P \Rightarrow Q$  is a kind of "logical promise"

"I promise that if  $P$  is true then  $Q$  is true"

When is a promise false or broken?

ex) if <sup>P</sup> you eat your veggies, then <sup>Q</sup> you get ice cream.

when would this be a lie?

eats his veggies, but no ice cream  
 $P$  is True but  $Q$  is False  
promise is false

is this promise broken/false when...

doesn't eat veggies, still gets ice cream  
promise is true

→  $P$  is false,  $Q$  true

$P \Rightarrow Q$  true

"vacuously true"

doesn't eat veggies, doesn't ice cream  
promise is true!

→  $P$  is false,  $Q$  is false

$P \Rightarrow Q$  true

does eat veggies, gets ice cream  
promise is true!!

$P$  is T,  $Q$  is T

$P \Rightarrow Q$  true

P	Q	$P \Rightarrow Q$
T	T	T
T	F	F
F	T	T
F	F	T

P	Q	$P \odot Q$
T	T	T
T	F	T
F	T	F
F	F	T

Our main logical operators

$\neg$  negation

$\wedge$  and 

$\vee$  or

$\oplus$  xor

$\Rightarrow$  if-then, implication, condition

$\Leftrightarrow$  if-and-only-if, biconditional

P	Q	$P \wedge Q$
T	T	T
T	F	F
F	T	F
F	F	F

If  $3 > 7$ , then  $1 = 0$ .

False      this is true.      False

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If pigs fly, I will give you \$1000.00

vacuously true

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$P: e^0 = 1$  True

$Q: \sin(0) = 2$  False

$P \Rightarrow Q$

false

$Q \Rightarrow P$

(vacuously) true