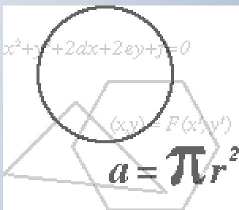


Warm up

Using the phrase "an honors student" as the hypothesis:

1) Create a true conditional
2) Write its converse
3) Determine the truth value of the converse

Bonus for coming up w/a true conditional & converse!

H: a student is an h. student

C: they take ≥1 h. class

Biconditional

Combine the halves of a **true** conditional

and its **true** converse

with the phrase ***if and only if.***

****** THE CONVERSE MUST BE TRUE! ******

$p \to q$

if p then q

p hyp

q concl

Formal definition

cond.

If $p \to q$ is true and $q \to p$ is true

converse

then p if and only if q

$p \leftrightarrow q$

p if and only if q

iff

Biconditional

Example – Pg 75, Check Understanding #1

Conditional:

H C

If three points are collinear, then they lie on the same line. T

Converse:

If three points lie on the same line, then they are collinear. T

iff

Converse is true

Biconditional:

iff

Three points are collinear if and only if they lie on the same line.

Short hand

Shorten the phrase “if and only if” to “*iff*”

Three points are collinear *iff* they lie on the same line

Short hand

Shorten the phrase “if and only if” to “*iff*”

Three points are collinear ***iff*** they lie on the same line

Symbol form

$p \leftrightarrow q$

iff

Means: statement p if and only if statement q.

Formal definition

A biconditional combines $p \rightarrow q$ and $q \rightarrow p$ as $p \leftrightarrow q$.

Taking a biconditional apart

1. Use left side of ***iff*** as hypothesis
2. Use right side of ***iff*** as conclusion
3. Form the conditional statement
4. Create the converse of this conditional statement

Example – Pg 78, #8

Biconditional:

if An integer is divisible by 100 ~~iff~~ then its last two digits are zeros.

Conditional:

If an integer is divisible by 100, then its last two digits are zeros. T

Converse:

If an integer's last two digits are zeros, then it is divisible by 100. T

What makes a good definition?

1. Uses only clearly understood (or already defined) terms
2. Is precise (no words like large, sort of, some, part, etc)
3. It is reversible (is a biconditional)

To show a definition is not a good definition:

…find a counter-example.

Example – Pg 77, Check Understanding #3

<u>Definition</u>: A right angle is an angle whose measure is 90.

<u>Conditional</u>: If an angle is a right angle then its measure is 90

<u>Converse</u>: If the measure of an angle is 90 then it is a right angle

Both conditional and converse are true so it is reversible

<u>Biconditional</u>:

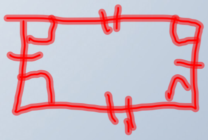
An angle is a right angle iff its measure is 90

Example – Pg 77, Check Understanding #4

Does it use clearly understood terms? ✓

Is it precise? ✓

Is it reversible?



Conditional: If a figure is a square, then it has four right angles.

Converse: If a figure has four right angles, then it is a square.

NOT REVERSIBLE $\therefore$ NOT A GOOD DEFINITION

Example – Pg 78, #18

Does it use clearly understood terms? Y Dud

Is it precise? Y

Is it reversible? N

Conditional: If an animal is a cat, then it has whiskers.

Converse: If an animal has whiskers, then it is a cat.

THEREFORE

NOT REVERSIBLE $\therefore$ NOT A GOOD DEFINITION

Example – Pg 78, #20

Does it use clearly understood terms? y

Is it precise? N

No – "part of a line" is ambiguous.

Both a ray and a point are "part of a line" too...

NOT PRECISE ∴ NOT A GOOD DEFINITION

Pg 78
1-13 odd
17-23 odd
27-35 odd
41
43-46