MGF /

Symbolic Translation of Conditional and Biconditional Statements – Basic

You will be asked to translate statements in descriptive form (wording) to symbolic form (symbols) and vice versa.

The symbols needed for this topic and their descriptions are as follows.

Write the symbols for each operator below in your notes.

Let m and n represent two statements:

Negation: $\sim m$:   Not m.   It is not the case that m.   It is not true that m.   It is false that m.

Conditional: $m \rightarrow n$:   If m, then n.

                     If m, n.   (Sometimes "then" is not written but implied.)

                     n if m.

                     m only if n.

                     m is sufficient for n.

                     n is necessary for m.

Biconditional: $m \leftrightarrow n$: m if and only if n.

                     m iff n.   (Note: "iff" is an abbreviation for "if and only if.")

                     m is necessary and sufficient for n.

EXAMPLE 1

If the statements are in descriptive form, translate to symbolic form and if the symbolic form is given, translate into descriptive form. Consider the two statements:

     p: It is snowing.

     q: John is wearing shorts.

Descriptive Form	Symbolic Form
If it is snowing, then John is not wearing shorts.	
	$q \leftrightarrow \sim p$

Solution

Descriptive Form	Symbolic Form
If it is snowing, then John is not wearing shorts.	$p \rightarrow \sim q$
John is wearing shorts if and only if it is not snowing.	$q \leftrightarrow \sim p$

In a later topic, you will learn that the statement "John is wearing shorts if and only if it is not snowing" is the same as "If John is wearing shorts then it is not snowing and if it is not snowing then John is wearing shorts."

EXAMPLE 2

If the statements are in descriptive form, translate to symbolic form and if the symbolic form is given, translate into descriptive form. Consider the two statements:

     p: Anthony will take English this term.

     q: Anthony will take math this term.

Descriptive Form	Symbolic Form
Anthony will not take English this term if and only if Anthony will take math this term.	
	$\sim q \rightarrow p$

Solution

Descriptive Form	Symbolic Form
Anthony will not take English this term if and only if Anthony will take math this term.	$\sim p \leftrightarrow q$
If Anthony will not take math this term, then Anthony will take English this term.	$\sim q \rightarrow p$

In a later topic, you will learn that the statement "Anthony will not take English this term if and only if Anthony will take math this term" is the same as "If Anthony will not take English this term then Anthony will take math this term and if Anthony will take math this term then Anthony will not take English this term."

#Logic