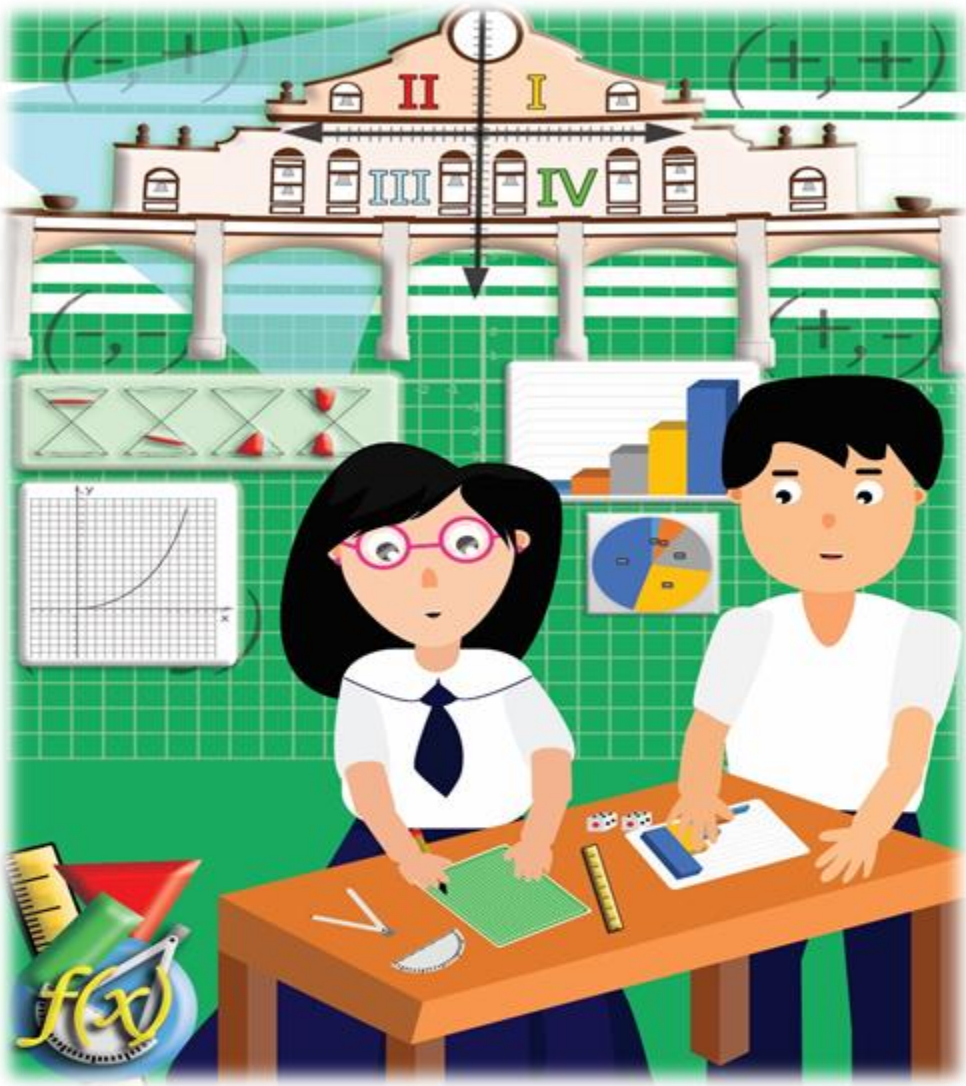
Senior High School

Department of Education
National Capital Region
SCHOOLS DIVISION OFFICE
MARIKINA CITY

GENERAL MATHEMATICS

Quarter 2: Module 7

Truth Table of Propositions and Different Forms of Conditional Propositions



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What I Need to Know

This module is designed and written with you, the learners, in mind. It is here to help you master the lesson on Truth Values of Propositions. The scope of this module is to determine the truth values of propositions and illustrate the different forms of conditional propositions.

This module is divided into 2 lessons:

Lesson 1: Truth Table of Propositions
Lesson 2: Different Forms of Conditional Propositions

After going through this module, you are expected to:

1. determine the truth values of propositions (M11GM-IIh-1); and,
2. illustrate different forms of conditional propositions (M11GM-IIh-2).

What I Know

Choose the letter that corresponds to the exact answer. Write your answer on another sheet of paper.

1. If the truth value of a proposition p is true, what is the truth value of its negation ~p?
   A. True C. Sometimes True
   B. False D. Cannot be determined

2. What are the truth values of the propositions p and q for the disjunction p v q to be false?
   A. Both are True C. p is true and q is false
   B. Both are False D. Cannot be determined

3. What are the truth values of the propositions p and q for the conjunction p ^ q to be true?
   A. Both are True C. p is true and q is false
   B. Both are False D. Cannot be determined

4. Which of the following statements is TRUE for the propositions p and q for the conditional statement $p \rightarrow q$ to be false?
   I. p is true and q is true.
   II. p is true and q is false.
   III. p is false and q is true.
   IV. p is false and q is false.
   A. I only C. III only
   B. II only D. IV only

4. Which of the following statements is TRUE for the propositions p and q for the biconditional statement to be TRUE?
   I. p is true and q is true.
   II. p is true and q is false.
   III. p is false and q is true.
   IV. p is false and q is false.

   A. I and II only
   B. II and III only
   C. I and III only
   D. I and IV only

For number 6-10, given the propositions p and q,

p: It is raining today.

q: The internet signal in the Philippines is slow.

6. What is the conditional statement $p \rightarrow q$?
   A. If it is raining today, then the internet signal in the Philippines is slow.
   B. If the internet signal in the Philippines is slow, then it is raining today.
   C. If it is not raining today, then the internet signal in the Philippines is not slow.
   D. If the internet signal in the Philippines is not slow, then it is not raining today.
7. Which of the following statements is the contrapositive of the conditional statement in number 6?
   A. If it is raining today, then the internet signal in the Philippines is slow.
   B. If the internet signal in the Philippines is slow, then it is raining today.
   C. If it is not raining today, then the internet signal in the Philippines is not slow.
   D. If the internet signal in the Philippines is not slow, then it is not raining today.
8. Which of the following is the converse of the conditional statement in number 6?
   A. If it is raining today, then the internet signal in the Philippines is slow.
   B. If the internet signal in the Philippines is slow, then it is raining today.
   C. If it is not raining today, then the internet signal in the Philippines is not slow.
   D. If the internet signal in the Philippines is not slow, then it is not raining today.

9. Which of the following statements is the inverse of the conditional statement in number 6?

A. If it is raining today, then the internet signal in the Philippines is slow.
B. If the internet signal in the Philippines is slow, then it is raining today.
C. If it is not raining today, then the internet signal in the Philippines is not slow.
D. If the internet signal in the Philippines is not slow, then it is not raining today.

10. Which of the following statement is true?

A. The conditional statement and its inverse are logically equivalent.
B. The conditional statement and its converse are logically equivalent.
C. The conditional statement is logically equivalent to its contrapositive.
D. The conditional statement is logically equivalent to its inverse, converse and contrapositive.

LESSON 1: Truth Table of Propositions

What's In

Given the propositions p and q, determine if the following statements is a conjunction, disjunction, conditional or biconditional.

p: I love Mathematics

q: I love English

1. I love Mathematics and English.
2. I love Mathematics or English.
3. If I love Mathematics, then I love English.
4. I love Mathematics if and only if I love English.

What's New

Consider the agreement between you and your parents and determine if the given situations is TRUE (if you think it is fair to you) or FALSE (if you think it is unfair to you).

Your parents told you that if you get a perfect score on the final examination in Mathematics, they will treat you to your favorite restaurant.

What if:

1. You got a perfect score in the final examination in Mathematics; your parents treated you to your favorite restaurant.
2. You got a perfect score in the final examination in Mathematics; your parents did not treat you to your favorite restaurant.
3. You missed a point in the final examination in Mathematics; your parents treated you to your favorite restaurant.
4. You missed a point in the final examination in Mathematics; your parents did not treat you to your favorite restaurant.

Among the four situations, which do you think is unfair to you? Which do you consider as a FALSE statement? Why did you feel bad about it?

What is It

One way to determine the truth value of a proposition is by constructing a Truth table. A **truth table** shows how the **truth** or falsity of a compound statement depends on the **truth** or falsity of the simple statements from which it is constructed.

The following truth table for the negation, conjunction, disjunction, conditional and biconditional are useful in constructing truth table of compound propositions.

Definition:

1. The truth values for the proposition p is either true or false but not both, whose truth table is defined by:

p
T
F

2. The negation of the proposition p is denoted by ~p, whose truth table is defined by:

p	~p
T	F
F	T

- When the truth value of the proposition p is true, the truth value of its negation ~p is false.
- When the truth value of the proposition p is false, the truth value of its negation ~p is true.

3. The conjunction of the propositions p and q is denoted by p ^ q, whose truth table is defined by:

p	q	p ^ q
T	T	T
T	F	F
F	T	F
F	F	F

- ❖ The conjunction p ^ q is true when the truth values of the propositions p and q are both true.

4. The disjunction of the propositions p and q is denoted by the p v q, whose truth table is defined by:

p	q	p v q
T	T	T
T	F	T
F	T	T
F	F	F

- ❖ The disjunction p v q is false when the truth values of the propositions p and q are both false.

5. The conditional of the propositions p and q, denoted by p → q, whose truth table is defined by:

p	q	p → q
T	T	T
T	F	F
F	T	T
F	F	T

- ❖ In the conditional statement p → q, p is called the hypothesis and q is called the conclusion.
- ❖ The conditional statement is false when the hypothesis (p) is true, and the conclusion (q) is false.

6. The biconditional of the propositions p and q, denoted by p ↔ q, whose truth table is defined by:

p	q	p ↔ q
T	T	T
T	F	F
F	T	F
F	F	T

- ❖ The biconditional statement p ↔ q is true when the propositions p and q have the same truth values.

To construct a truth table of compound propositions, these steps are helpful.

1. Determine the number of rows which is given by 2^n where n is the number of simple propositions (p, q, r…)
2. Determine the truth values of the connectives inside the parentheses.
3. Determine the truth values of the dominant connective after doing the truth values inside the parentheses.

Example 1: Construct a truth table for the proposition

$((p \vee q) \rightarrow (q \wedge r)) \leftrightarrow \sim p$.

Solution:

1. Determine the number of rows. Since there are three propositions p, q, and r, the truth table will have $2^3 = 8$ number or rows whose truth values are:

p	q	r
T	T	T
T	T	F
T	F	T
T	F	F
F	T	T
F	T	F
F	F	T
F	F	F

2. Determine the truth values values of the connectives inside the parentheses which are $(p \vee q)$ and $(q \wedge r)$ before doing the connective $\rightarrow$ between the parentheses.
   The column for the disjunction $(p \vee q)$ is false when the truth values of p and q are both false and the column for the conjunction $(q \wedge r)$ is true when the truth values of the propositions q and r are both true.

p	q	r	$p \vee q$	$q \wedge r$
T	T	T	T	T
T	T	F	T	F
T	F	T	T	F
T	F	F	T	F
F	T	T	T	T
F	T	F	T	F
F	F	T	F	F
F	F	F	F	F

3. Determine the truth values of the connective $\rightarrow$ between the parentheses $(p \vee q)$ and $(q \wedge r)$. The column for the conditional $(p \vee q) \rightarrow (q \wedge r)$ is false, when the hypothesis $(p \vee q)$ is true and the conclusion $(q \wedge r)$ is false.

p	q	r	$p \vee q$	$q \wedge r$	$(p \vee q) \rightarrow (q \wedge r)$
T	T	T	T	T	T
T	T	F	T	F	F
T	F	T	T	F	F
T	F	F	T	F	F
F	T	T	T	T	T
F	T	F	T	F	F
F	F	T	F	F	T
F	F	F	F	F	T

4. Determine the truth values of th negation of p denoted by ~p before performing the dominant connective ↔ for the last column.

p	q	r	p v q	q ^ r	(p v q) → (q ^ r)	~p
T	T	T	T	T	T	F
T	T	F	T	F	F	F
T	F	T	T	F	F	F
T	F	F	T	F	F	F
F	T	T	T	T	T	T
F	T	F	T	F	F	T
F	F	T	F	F	T	T
F	F	F	F	F	T	T

5. Determine the truth values of the dominant connective ↔ for the last column. The dominant connective ↔ for the proposition ((p v q) → (q ^ r)) ↔ ~p is true when the propositions ((p v q) → (q ^ r)) and ~p have the same truth values.

p	q	r	p v q	q ^ r	(p v q) → (q ^ r)	~p	((p v q) → (q ^ r)) ↔ ~p
T	T	T	T	T	T	F	F
T	T	F	T	F	F	F	T
T	F	T	T	F	F	F	T
T	F	F	T	F	F	F	T
F	T	T	T	T	T	T	T
F	T	F	T	F	F	T	F
F	F	T	F	F	T	T	T
F	F	F	F	F	T	T	T

What's More

Complete the table indicated by the numbers 1-10 with the correct truth values of the proposition **((p → q) ^ (q ↔ r)) →(p ^ ~p)**.

p	q	r	p → q	q ↔ r	(p → q) ^ (q ↔ r)	~p	(r ^ ~p)	((p → q) ^ (q ↔ r)) → (r ^ ~p)
T	T	T	T	**1** ____	T	F	F	**9** ________
T	T	F	T	**2** ____	F	F	F	T
T	F	T	F	F	**3** _____	F	F	T
T	F	F	F	T	**4** _____	**5**__	F	T
F	T	T	T	T	T	**6** __	**7** ____	T
F	T	F	T	F	F	T	**8** ____	T
F	F	T	T	F	F	T	T	T
F	F	F	T	T	T	T	F	**10** ________

What I Have Learned

Write the term/expression that will complete the statements below.

1. The conjunction p ^ q is true when the truth values of the propositions p and q are both ________________.
2. The disjunction p v q is false when the truth values of the propositions p and q are both _______________.
3. The conditional statement is false when the hypothesis (p) is true, and the conclusion (q) is _____________________.
4. The biconditional statement p ↔ q is ___________ when the propositions p and q have the same truth values.

What I Can Do

Construct a truth table for the proposition **((p → q) ^ (q → r)) → (~q→~r).**

p	q	r	p → q	q → r	(p → q) ^ (q → r)	~q	~r	~q → ~r	((p → q) ^ (q → r)) → (~q→~r)
T	T	T				F	F		
T	T	F				F	T		
T	F	T				T	F		
T	F	F				T	T		
F	T	T				F	F		
F	T	F				F	T		
F	F	T				T	F		
F	F	F				T	T		

Rubrics for Scoring

Score	Description
15 points	100% complete solutions and correct answers are present in the submitted output.
10 points	75% of the solutions are correct but answer is incorrect.
5 points	50% 75% of the solutions are correct but answer is incorrect.
No point earned	No output was submitted.

Assessment

Complete the truth table by writing the correct truth values for each column for the proposition **(~ (p ^ q) ^ (~p)) → q**.

p	q	p ^ q	~ (p ^ q)	~p	(~ (p ^ q) ^ (~p))	(~(p ^ q) ^ (~p)) → q
T	T					
T	F					
F	T					
F	F					

Additional Activities

Construct a truth table for the proposition **((p → r) ^ (q → r)) → ((p v q) → r)**.

p	q	r	p → r	q → r	(p → r) ^ (q → r)	p v q	(p v q) → r	((p → r) ^ (q → r)) → ((p v q) → r)
T	T	T				T		
T	T	F				T		
T	F	T				T		
T	F	F				T		
F	F	T				F		
F	F	F				F		
F	T	T				T		
F	T	F				T		

LESSON 2: Different Forms of Conditional Propositions

What's In

Complete the table by writing the correct truth values for the conditional proposition p → q.

p	q	p → q
T	T	
T	F	
F	T	
F	F	

When is the conditional proposition false?

What's New

Which of the following statements do you think conveys the same meaning with the conditional statement:If you are a basketball player, then you are an athlete.

1. If you are an athlete, then you are a basketball player.
2. If you are not a basketball player, then you are not an athlete.
3. If you are not an athlete, then you are not a basketball player.

What is It

The given statements in What's New are the three propositions that can be derived from the conditional statement $p \rightarrow q$. These are the converse, inverse and contrapositive.

Definition:

Given propositions p and q.

The converse of the conditional proposition $p \rightarrow q$ is $q \rightarrow p$.

The inverse of the conditional statement $p \rightarrow q$ is $\sim p \rightarrow \sim q$.

The contrapositive of the conditional statement $p \rightarrow q$ is $\sim q \rightarrow \sim p$.

Two propositions p and q are **logically equivalent**, denoted by $p \Leftrightarrow q$, if they have the same truth values for all possible truth values of their simple propositions.

The first statement *If you are an athlete, then you are a basketball player* is the converse of the conditional statement *If you are a basketball player, then you are an athlete.*

From the truth table of the conditional and its converse,

p	q	$p \rightarrow q$
T	T	T
T	F	F
F	T	T
F	F	T

p	q	$q \rightarrow p$
T	T	T
T	F	T
F	T	F
F	F	T

it is clearly seen that the conditional and its converse are not logically equivalent which means that if the conditional statement is true, it does not always imply that its converse is also true.

The conditional statement *If you are a basketball player, then you are an athlete* is a true statement but its converse *If you are an athlete, then you are a basketball player* is a false statement because not all athletes are basketball players.

The second statement *If you are not a basketball player, then you are not an athlete* is the inverse of the conditional statement *If you are a basketball player, then you are an athlete.*

Similarly, the truth table of the conditional and its inverse are not logically equivalent. It means that if the conditional statement is true, it does not necessarily imply that its inverse is also true.

p	q	p → q
T	T	T
T	F	F
F	T	T
F	F	T

p	q	~p	~q	~p → ~q
T	T	F	F	T
T	F	F	T	T
F	T	T	F	F
F	F	T	T	T

From the second statement in What's New, the inverse *If you are not a basketball player, then you are not an athlete* is false statement (you can still be an athlete even if you are not a basketball player) while the conditional statement is true. The third statement *If you are not an athlete, then you are not a basketball player* is the contrapositive of the conditional statement *If you are a basketball player, then you are an athlete.*

Based on the truth table of the conditional statement and its contrapositive,

p	q	p → q
T	T	T
T	F	F
F	T	T
F	F	T

p	q	~p	~q	~q → ~p
T	T	F	F	T
T	F	F	T	F
F	T	T	F	T
F	F	T	T	T

it is clearly seen that the conditional and its contrapositive are logically equivalent which means that if the conditional statement is true, then its contrapositive is also true and if the conditional statement is false, then its contrapositive is also false.

Since the conditional statement *If you are a basketball player, then you are an athlete* is a true statement. It also means that its contrapositive *If you are not an athlete, then you are not a basketball player* is also a true statement (being not an athlete means you do not play any sports including basketball).

Examples:

1. Given the propositions p and q, write the conditional statement, its inverse, converse, and contrapositive.
   p: The price of gasoline increases.
   q: There is a fare hike.

Answer:

Conditional: If the price of gasoline increase, then there is a fare hike.
Inverse: If the price of gasoline does not increase, then there is no fare hike.
Converse: If there is a fare hike, then the price of gasoline increases.
Contrapositive: If there is no fare hike, then there is no increase in the price of the gasoline.

Determine whether the proposition (p ^ q) → r is logically equivalent to (~p v ~q) v r.

p	q	r	p ^ q	(p ^ q) → r
T	T	T	T	T
T	T	F	T	F
T	F	T	F	T
T	F	F	F	T
F	T	T	F	T
F	T	F	F	T
F	F	T	F	T
F	F	F	F	T

p	q	r	~p	~q	~p v ~q	(~p v ~q) v r
T	T	T	F	F	F	T
T	T	F	F	F	F	F
T	F	T	F	T	T	T
T	F	F	F	T	T	T
F	T	T	T	F	T	T
F	T	F	T	F	T	T
F	F	T	T	T	T	T
F	F	F	T	T	T	T

(p ^ q) → r is logically equivalent to (~p v ~q) v r.

What's More

I. Write the converse, inverse, and contrapositive of the conditional statement: If the internet signal is slow, then online classes are suspended.

II. Complete the table to determine if the proposition p v (q v r) is logically equivalent to (p v q) v r.

p	q	r	(q v r)	p v (q v r)
T	T	T		
T	T	F		
T	F	T		
T	F	F		
F	T	T		
F	T	F		
F	F	T		
F	F	F		

p	q	r	(p v q)	(p v q) v r
T	T	T		
T	T	F		
T	F	T		
T	F	F		
F	T	T		
F	T	F		
F	F	T		
F	F	F		

What I Have Learned

Write the term/expression that will complete the statements.

1. The converse of a conditional statement p → q is _________________.
2. The inverse of a conditional statement p → q is _________________.
3. The contrapositive of a conditional statement p → q is _______________.
4. Two propositions are logically equivalent if they have the same ______________.

What I Can Do

I. Write the converse, inverse, and contrapositive of the conditional statement *If I live in Barangay Malanday, then I am in Marikina City.*

II. Construct a truth table to determine if the proposition p ^ (q v r) is logically equivalent to (p ^ q) ^ r.

p	q	r	q v r	p ^ (q v r)
T	T	T		
T	T	F		
T	F	T		
T	F	F		
F	T	T		
F	T	F		
F	F	T		
F	F	F		

p	q	r	p ^ q	(p ^ q) ^ r
T	T	T		
T	T	F		
T	F	T		
T	F	F		
F	T	T		
F	T	F		
F	F	T		
F	F	F		

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5 points	50% 75% of the solutions are correct but answer is incorrect.
No point earned	No output was submitted.

Assessment

1. Given the propositions p and q, write the conditional statement, its inverse, converse, and contrapositive.
   p: I am a Mabuting Tao.
   q: I am a Marikeño.

2. Complete the table to determine if the proposition $p \rightarrow (q \vee r)$ is logically equivalent to $(p \vee q) \rightarrow r$.

p	q	r	(q v r)	p → (q v r)
T	T	T		
T	T	F		
T	F	T		
T	F	F		
F	T	T		
F	T	F		
F	F	T		
F	F	F		

p	q	r	(p v q)	(p v q) → r
T	T	T		
T	T	F		
T	F	T		
T	F	F		
F	T	T		
F	T	F		
F	F	T		
F	F	F		

Additional Activities

I. Given the propositions p and q. Write the conditional statement, its converse, inverse, and contrapositive.

p: You are studying in Malanday National High School

q: You live in Barangay Malanday, Marikina City

II. Determine if the proposition $p \rightarrow (q \vee r)$ is logically equivalent to $(p \wedge q) \rightarrow r$.

p	q	r	$q \vee r$	$p \rightarrow (q \vee r)$
T	T	T		
T	T	F		
T	F	T		
T	F	F		
F	T	T		
F	T	F		
F	F	T		
F	F	F		

p	q	r	$(p \wedge q)$	$(p \wedge q) \rightarrow r$
T	T	T		
T	T	F		
T	F	T		
T	F	F		
F	T	T		
F	T	F		
F	F	T		
F	F	F		

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General Mathematics: Published by the Department of Education

Chan. Miro. And Quiming. General mathematics: Published and Printed by Vibal Group Inc.

Answer Key

Lesson 1:

What I Know

1. B 2. B 3. A 4. B 5. D
6. A 7. D 8. B 9. C 10. C

What's In

1. Conjunction 2. Disjunction 3. Conditional 4. Biconditional

What's New

I will feel bad at #2 because my parents broke their promise.

What's More

1. T 2. F 3. F 4. F 5. F
6. T 7. T 8. F 9. F 10. T

What I Have Learned

1. True 2. False 3. False 4. True

What I Can Do

Construct a truth table for the proposition
((p → q) ^ (q → r)) → (~q→~r)

p	q	r	p → q	q → r	(p →q) ^ (q →r)	~q	~r	(~q →~r)	((p → q) ^ (q → r)) → (~q→~r)
T	T	T	T	T	T	F	F	T	T
T	T	F	T	F	F	F	T	T	T
T	F	T	F	T	F	T	F	F	T
T	F	F	F	T	F	T	T	T	T
F	T	T	T	T	T	F	F	T	T
F	T	F	T	F	F	F	T	T	T
F	F	T	T	T	T	T	F	F	F
F	F	F	T	T	T	T	T	T	T

Assessment

Complete the truth table by writing the correct truth values for each column for the proposition
(~ (p ^ q) ^ (~p)) → q

p	q	p ^ q	~ (p ^ q)	~p	(~ (p ^ q) ^ (~p))	(~ (p ^ q) ^ (~p)) → q
T	T	T	F	F	F	T
T	F	F	T	F	F	T
F	T	F	T	T	T	F
F	F	F	T	T	T	F

Additional Activities

Construct a truth table for the proposition
((p → r) ^ (q → r)) → ((p v q) → r)

p	q	r	p → r	q → r	(p → r) ^(q →r)	(p v q)	(p v q) → r	((p → r) ^ (q → r)) → ((p v q) → r)
T	T	T	T	T	T	T	T	T
T	T	F	F	F	F	T	F	T
T	F	T	T	T	T	T	T	T
T	F	F	F	T	F	T	F	T
F	T	T	T	T	T	T	T	T
F	T	F	T	F	F	T	F	T
F	F	T	T	T	T	F	T	T
F	F	F	T	T	T	F	T	T

Lesson 2:

What's In

p	q	p → q
T	T	T
T	F	F
F	T	T
F	F	T

The conditional statement is false, when the hypothesis (p) is true and the conclusion (q) is false.

What's New
Statement #3
What's More

I. Converse: If online classes are suspended, then the internet signal is slow.
Inverse: If the internet signal is not slow, then online classes are not suspended.
Contrapositive: If online classes are not suspended, then the internet signal is not slow.

II. Complete the table to determine if the proposition p v (q v r) is logically equivalent to (p v q) v r

p	q	r	(q v r)	p v (q v r)
T	T	T	T	T
T	T	F	T	T
T	F	T	T	T
T	F	F	F	T
F	T	T	T	T
F	T	F	T	T
F	F	T	T	T
F	F	F	F	F

p	q	r	(p v q)	(p v q) v r
T	T	T	T	T
T	T	F	T	T
T	F	T	T	T
T	F	F	T	T
F	T	T	T	T
F	T	F	T	T
F	F	T	F	T
F	F	F	F	F

Therefore, p v (q v r) is logically equivalent to (p v q) v r

What I Have Learned

1. q → p
2. ~p → ~q
3. ~q → ~p
4. Truth Values

What I Can Do

I. Write the converse, inverse, and contrapositive of the conditional statement If I live in Barangay Malanday, then I am in Marikina City.

Converse: If I am in Marikina City, then I live in Barangay Malanday
Inverse: If I do not live in Barangay Malanday, then I am not in Marikina City
Contrapositive: If I am not in Marikina City, then I do not live in Barangay Malanday.

II. Construct a truth table to determine if the proposition p ^ (q v r) is logically equivalent to (p ^ q) ^ r.

p	q	r	(q v r)	p ^ (q v r)
T	T	T	T	T
T	T	F	T	T
T	F	T	T	T
T	F	F	F	F
F	T	T	T	F
F	T	F	T	F
F	F	T	T	F
F	F	F	F	F

p	q	r	(p ^ q)	(p ^ q) ^ r)
T	T	T	T	T
T	T	F	T	F
T	F	T	F	F
T	F	F	F	F
F	T	T	F	F
F	T	F	F	F
F	F	T	F	F
F	F	F	F	F

Therefore, p ^ (q v r) is logically equivalent to (p ^ q) ^ r.

Assessment

1. Given the propositions p and q, write the conditional statement, its inverse, converse, and contrapositive.
   p: I am a Mabuting Tao.
   q: I am a Marikeño.

Conditional: If I am a Mabuting Tao, then I am a Marikeño.
Inverse: If I am not a Mabuting Tao, then I am not a Marikeño.
Converse: If I am a Marikeño, then I am a Mabuting Tao
Contrapositive: If I am not a Marikeño, then I am not a Mabuting Tao

2. Complete the table to determine if the proposition p → (q v r) is logically equivalent to (p v q) → r

p	q	r	(q v r)	p → (q v r)
T	T	T	T	T
T	T	F	T	T
T	F	T	T	T
T	F	F	F	F
F	T	T	T	T
F	T	F	T	T
F	F	T	T	T
F	F	F	F	T

p	q	r	(p v q)	(p v q) → r
T	T	T	T	T
T	T	F	T	F
T	F	T	T	T
T	F	F	T	F
F	T	T	T	T
F	T	F	T	F
F	F	T	F	T
F	F	F	F	T

Additional Activities

I. Given the propositions p and q. Write the conditional statement, its converse, inverse, and contrapositive.
p: You are studying in Malanday National High School
q: You live in Barangay Malanday, Marikina City

Conditional: If you are studying in Malanday National High School, then you live in Barangay Malanday, Marikina City.

Converse: If you live in Barangay Malanday, Marikina City, then you are studying in Malanday National High School

Inverse: If you are not studying in Malanday National High School, then you do not live in Barangay Malanday, Marikina City.

Contrapositive: If you do not live in Barangay Malanday, Marikina City, then you are not studying in Malanday National High School

II. Determine if the proposition $p \rightarrow (q \vee r)$ is logically equivalent to $(p \wedge q) \rightarrow r$.

p	q	r	$(q \vee r)$	$p \rightarrow (q \vee r)$
T	T	T	T	T
T	T	F	T	T
T	F	T	T	T
T	F	F	F	F
F	T	T	T	T
F	T	F	T	T
F	F	T	T	T
F	F	F	F	T

p	q	r	$(p \wedge q)$	$(p \wedge q) \rightarrow r$
T	T	T	T	T
T	T	F	T	F
T	F	T	F	T
T	F	F	F	T
F	T	T	F	T
F	T	F	F	T
F	F	T	F	T
F	F	F	F	T

Therefore, $p \rightarrow (q \vee r)$ is not logically equivalent to $(p \wedge q) \rightarrow r$.

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