

Applied Math 40S

Name: _____

Logic Statements Hand In Assignment

Complete the following questions in the spaces provided. Show all work where applicable. Hand in this assignment when finished.

1. Consider the following statement:

If you are talking to a teacher, then you are talking to Gord.

- a) State the hypothesis.

- b) State the conclusion.

- c) State whether or not this statement is true. If the statement is false, provide a counter-example.

2. Consider the following statement:

If a polynomial function is quadratic, then its domain is $(-\infty, \infty)$.

- a) State whether or not this statement is true. If the statement is false, provide a counter-example.

- b) Write the converse of this conditional statement.

- c) State whether or not the **converse** of the given statement is true. If the converse is false, provide a counter-example.

3. Consider again the statement and its converse given in question 2 on the previous page. Is the original statement biconditional? If so, write it below in biconditional form. If not, justify how you know it is not.

4. Fill in the blank places in the table below.

Type	Statement	True or False?	Counter-Example (if false)
Original Statement	If a number is prime, then it is an odd number.		
Converse			
Inverse			
Contrapositive			

5. Consider the following statement:

If an animal is a cat, then it has four legs.

- a) State whether or not this statement is true. If the statement is false, provide a counter-example.

- b) Write the contrapositive of this statement.

- c) State whether or not the contrapositive of this statement is true. If the contrapositive is false, provide a counter-example.

6. Consider the statement shown below:

If a number is divisible by 3, then it is also divisible by 9.

- a) State whether or not this statement is true. If the statement is false, provide a counter-example.

- b) Write the inverse of this statement.

- c) State whether or not the inverse of this statement is true. If the inverse is false, provide a counter-example.

7. Fill in the blank spaces on the truth tables shown below.

a)

p	q	$p \vee q$
True	True	
True	False	
False	True	
False	False	

b)

H	K	$H \leftrightarrow K$
True	True	
True	False	
False	True	
False	False	

c)

p	q	$\neg p$	$q \Rightarrow \neg p$
T	T		
T	F		
F	T		
F	F		

8. Consider the statement shown below:

If a number is a multiple of 10, then it is also a multiple of 5.

Use the truth table below to determine if this statement is *biconditional*. Be sure to fill out all of the boxes in the table. If $p \rightarrow q$ or $q \rightarrow p$ results in a false statement, be sure to provide a counter-example in the space provided.

p	q	$p \rightarrow q$	$q \rightarrow p$	$p \leftrightarrow q$

Counter-example (if needed): _____

9. Consider the conditional statement shown below:

If a person is currently playing soccer, then that person is exercising.

Use truth tables to determine the truth of the original conditional statement, and its converse, inverse, and contrapositive. If at any point the truth table returns a result of 'false', provide a counterexample.

Refer to Lesson 6, Example 6 in your booklet if you would like to see this process in action. This type of question will **NOT** be included on your unit test (and hopefully not on the exam!)

10. Is the statement given in question 9 biconditional? State yes or no, and justify your answer.