

Name: _____

Homework 4: Propositional Logic

Due date: Friday 2/26/21 Submit the assignment via Canvas Assignments. Upload homework as one pdf document. A scanner app like Cam Scanner will make this possible. Any HW submitted after the due date will have late penalty.

1. Let p and q represent the following simple statements:

p : *The refrigerator is working.*

q : *The milk is warm.*

Translate the symbolic statement into English. (1 point each)

a. $\neg q \rightarrow p$

b. $\neg p \wedge \neg q$

2. Let p , q , and r represent the following simple statements:

p : *The car has been repaired*

q : *The kids are home*

r : *We will visit Aunt Tillie*

Write the following compound statements in symbolic form. Use the dominance of connectives to show grouping symbols (parentheses) in symbolic statements. (2 points each)

- a. *The car has been repaired, and if the kids are home then we will visit Aunt Tillie.*

- b. *We will not visit Aunt Tillie if and only if the kids are not home.*

3. Form truth tables for each symbolic statement given. (4 points each)

a. $(p \wedge q) \rightarrow r$

p	q	r		

b. $\neg p \leftrightarrow (p \vee \neg q)$

p	q				

4. For parts a-c, refer to the following statement: (2 points each)

"If you are sleeping, then you are not studying."

- a. Write a logically equivalent conditional statement in English (Use the contrapositive):

- b. Write the **negation** of the statement in English using the connective AND:

- c. Write a logically equivalent statement in English using the connective OR:

5. Write an equivalent conditional statement in English for the following: (2 points)

If you got the math problem wrong, then you made a small mistake or you don't get the concept.

6. Write the negation of the following statement in English: (2 points)

"All of my friends are happy and some are wealthy."

7. Given the following argument:

I am sick or I am tired.
I am not tired.
 \therefore I am sick.

- a. Assign variables to the simple statements. (1 point)

p : _____

q : _____

- b. Rewrite the argument using variables and operators. (1 point)

- c. Use a truth table to prove the argument is valid. (3 points)

p	q					

- d. Is the argument valid? (1 point)