Math 6e: Homework 6

HW#6 is due November 4; submit to Google Classroom 15 minutes before class.
Please write clearly which problem you are solving and show all steps of your solution.

Logical variables are basic statements labeled with A, B, C, …, that can be evaluated as T or F.

For example, ***A = "Bill is a knight"*** and ***C = "Carl is a knight"*** can be evaluated as True or False.

Logical operations AND, OR, NOT combine variables (statements) in more complicated statements.
A **truth table** for a logic operation evaluates all possible combinations of two variables that are combined by the logical operation.

Examples: Operation AND: A **AND** B = "Bill is a knight **AND** Carl is a knight"
Operation OR: A **OR** B = "Bill is a knight **OR** Carl is a knight",
Operation NOT: **NOT** A = " Bill is not a knight".

Truth tables: be sure to use the truth tables for AND, OR, NOT, XOR, NOT

Homework questions

Instructions: questions 1 and 2 should be written on a separate sheet(s) of paper. Do not write on the printout. For the Quiz preparation part (page 2 of the homework), write your answer on the printed page.

1. Verify the associative property of OR

Create and fill out a truth table for the variables P, Q, and R for the left and right sides of the formula (equation). Then check whether the left side equals the right side. *Hint*: you need 8 rows in a truth table for three logical variables.

P *OR (****Q*** *OR* ***R****) = (****P*** *OR* ***Q****) OR* ***R***:
(left side) ?= (right side)

(left side)

P	***Q***	***R***	***Q*** *OR* ***R***	***P*** *OR (****Q*** *OR* ***R****)*

(right side)

P	***Q***	***R***	***P*** *OR* ***Q***	*(****P*** *OR* ***Q****) OR* ***R***

2. In the same way as above, verify the associative property of XOR.

Quiz preparation questions

Print this page. Write your answers directly here in the provided space. Submit as part of your homework.

1. Represent the following statements with logical variables. You could pick any letter!
   "Pam is going to school." _____
   "Quincy is going to school." _____
   "Richard is going to school." _____

2. Use these variables and the operations AND, OR, NOT, (If→ $THEN$) to write logical formulas for each compound statement:
   a. "Pam is not going to school." _____
   b. "Pam is going to school, but Quincy is not." _____
   c. "If Pam is going to school, then Quincy is going." _____
   d. "Either Pam is not going to school, or Quincy is not going to school." _____
   e. "If Pam is going to school, then both Quincy and Richard are going." _____

3. Write a truth table for the compound statement using logic variables and operations.
   "Richard is going to school, and Quincy is going to school."

4. Create a truth table and evaluate the logical formula for the variables P and Q.
   (Not P) AND (P OR Q)