Math 6e: Homework 6

HW#6 is due October 29; submit to Google Classroom 15 minutes before class.

Please, write clearly which problem you are solving and show all steps of your solution.

Logic 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 (answered) as True or False.

Logic 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 logic 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",
Operations 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
Hint: create and fill out a truth table for the variables ***P, Q,*** and ***R,*** for the left and for the right side of the formula (equation). Then check whether the left side equals the right side.

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***

How many rows do you have in a truth table for three logical variables?

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

Assume these are the questions given on a quiz next week. Print, answer on this page, and attach the page with your answers to your homework:

Quiz preparation questions:

1. Represent the following statements with logic 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 to write logic 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 logic formula for the variables P and Q.
   (Not P) AND (P OR Q)