

Quiz 1 :: Math 8 Fall 2024

Name: Euler
PERM# 007

1. 3pts) A student came to office hours and made a remarkable comment. The student said the following, " I noticed for real numbers we have the distributive property. Here is an example $2 \cdot (1 + 4) = 2 \cdot 1 + 2 \cdot 4$. We have two operations "." and "+" for real numbers and I noticed we have two "operations" for propositional statements: " \vee " and " \wedge ". After doing a couple of examples I came to the following conclusion:
 $P \wedge (Q \vee R)$ is logically equivalent to $(P \wedge Q) \vee (P \wedge R)$, or
 $P \wedge (Q \vee R)$ is logically equivalent to $(P \vee Q) \wedge (P \vee R)$."
 Use the truth table below to conclude what $P \wedge (Q \vee R)$ is logically equivalent to, then state your answer on the line below.

P	Q	R	$Q \vee R$	$P \wedge Q$	$P \wedge R$	$P \wedge (Q \vee R)$	$(P \vee Q) \wedge (P \vee R)$	$(P \wedge Q) \vee (P \wedge R)$
T	T	T	T	T	T	T	T	T
T	T	F	T	T	F	T	T	T
T	F	T	T	F	T	T	T	T
T	F	F	F	F	F	F	T	F
F	T	T	T	F	F	F	T	F
F	T	F	T	F	F	F	F	F
F	F	T	T	F	F	F	F	F
F	F	F	F	F	F	F	F	F

Answer: Is equivalent to $(P \wedge Q) \vee (P \wedge R)$.

2. (0 points) Let p, q, s be propositions. Suppose p is false, q is false, s is true. Find the truth value of

$$(s \wedge p) \vee (q \wedge \sim s)$$

Since s is true and p are is false their conjunction is false. Since q is false the conjunction with any other statement will be false. Hence, the disjunction of two false statements is false. Ergo, this statemnet is false.