

Name: _____ Date: _____

Quiz 2 Median: 7.5/10

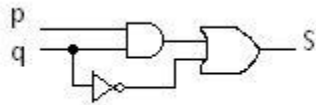
- 1) Negate the statement “Helen’s average is less than 90 or Helen is not getting an A.”
Helen’s average is at least 90 and Helen is getting an A.
- 2) Verify the logical equivalence $p \wedge q \rightarrow r \equiv \neg p \vee (q \rightarrow r)$ by completing this truth table

p q r	$p \wedge q \rightarrow r$	\equiv	$\neg p \vee (q \rightarrow r)$
F F F	T		T
F F T	T		T
F T F	T		T
F T T	T		T
T F F	T		T
T F T	T		T
T T F	F		F
T T T	T		T

- 3) Verify the logical equivalence $p \wedge q \rightarrow r \equiv \neg p \vee (q \rightarrow r)$ by using Theorem 1.1, 1.2 and the alternate representation of the conditional $p \rightarrow q \equiv \neg p \vee q$.

$$\begin{aligned}
 p \wedge q \rightarrow r &\equiv \neg(p \wedge q) \vee r && \text{Alternate representation of conditional} \\
 &\equiv (\neg p \vee \neg q) \vee r && \text{DeMorgan's} \\
 &\equiv \neg p \vee (\neg q \vee r) && \text{Associativity} \\
 &\equiv \neg p \vee (q \rightarrow r) && \text{Alternate representation of conditional}
 \end{aligned}$$

- 4) A) Trace the pictured circuit to determine an expression for the output in terms of the input.
B) Make an input-output table.
C) Could the same input-output table be accomplished by a circuit using fewer basic gates? Example.



$$S = (p \wedge q) \vee \neg q$$

p q	S
0 0	1
0 1	0
1 0	1
1 1	1

Less gates if possible: $S = \neg q \vee p$