Name: _____ **Quiz 1**

Math 301 Discrete Mathematics – Crawford **20 February 2019**

Books, calculators, and notes (in any form) are not are allowed. Show all your work for credit. ***Good luck!***

1. (6 pts) Use a truth table to determine whether the following argument form is valid. Indicate which columns represent the premises and which represent the conclusion, and include a sentence explaining how the truth table supports your answer.

$$\begin{array}{ll} & p \to q \vee r \\ & \sim q \vee \sim r \\ \therefore & \sim p \vee \sim r \end{array}$$

p	q	r	
T	T	T	
T	T	F	
T	F	T	
T	F	F	
F	T	T	
F	T	F	
F	F	T	
F	F	F	

2. (3 pts) Given the following argument,

If Jack aced his interview, then Jack will attend Harvard Law School.
Jack will attend Harvard Law School.
∴ Jack aced his interview.

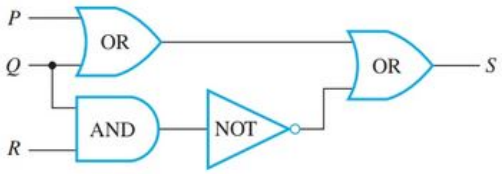
(a). Use symbols to write the logical form of the argument.

(b). State whether the converse error, inverse error, or neither is made in the argument.

3. (1 pts) Which of the following argument forms represents Generalization? [Circle One.]

$$\begin{array}{ll} & p \vee q \\ & \sim p \\ \therefore & q \end{array} \qquad \begin{array}{ll} & q \\ \therefore & p \vee q \end{array} \qquad \begin{array}{ll} & p \\ & q \\ \therefore & p \wedge q \end{array}$$

4. (4 pts) Given the circuit below,



(a). Determine the output signal S if the input signals are $P = 0, Q = 0$, and $R = 0$.[Show the input, intermediate, and output signals on the diagram above.]

(b). Find the Boolean expression that corresponds to the circuit.

5. (2 pts) Given the following statement: $\exists x \in \mathbb{Z}$ such that $x^3 = -8$.

Which of the following statements are equivalent ways of expressing the original statement. No justification necessary.

(a). If x is an integer, then $x^3 = -8$.

(b). Some integers have a cube of -8.

(c). Some integer has a cube of -8.

(d). The number x has a cube of -8, for at least one integer x.

6. (4 pts) Determine whether the following statements are TRUE or FALSE. If it is FALSE, give a COUNTEREXAMPLE.

(a). Every integer is a real number.

(b). $\forall$ real numbers x and y, $\sqrt{x+y} = \sqrt{x} + \sqrt{y}$.