Fall 2018 COT 3100 Section 1 Quiz #1

Name: _____

Lab Section: 18(R9) 19(R10) 20(R11) 21(T2) 22(T3) 23(T4) 24(T5)

1) (8 pts) Complete the truth table below to evaluate the Boolean expression $(\overline{p \wedge \bar{q}}) \vee \bar{r}$. **Please use T for true and F for false and clearly write your letter so the grader doesn't confuse what you meant to write.**

p	q	r	$p \wedge \bar{q}$	$\overline{p \wedge \bar{q}}$	$\bar{r}$	$(\overline{p \wedge \bar{q}}) \vee \bar{r}$
F	F	F				
F	F	T				
F	T	F				
F	T	T				
T	F	F				
T	F	T				
T	T	F				
T	T	T				

2) (7 pts) Prove that the equation $18 + a^2 = b^2$ has no solutions for a and b such that both are integers. In class, we proved that if n is an odd integer, then $n^2 \equiv 1 \pmod 8$. This means that if n is an odd integer, then $n^2 \equiv 1 \pmod 4$. Use this result as a step in this proof. Start your proof by showing that if n is an even integer, then $n^2 \equiv 0 \pmod 4$. Then, utilizing these two facts, show that it's impossible for the left and right hand sides to be equivalent (mod 4), and use this to conclude that there are no integer solutions for a and b. (Note: this is a challenging question, but I wanted to see who would be able to solve it. I made it worth a small number of points so that it doesn't hurt students' grades too much but I still get to reward the students who solve it.)

3) (10 pts) Using the following given propositions and the rules of inference, prove the conclusion below the dotted line. Note: You may not use all the slots given to you below.

$$p \rightarrow (q \wedge r)$$
$$q \rightarrow s$$
$$\bar{u} \rightarrow (\bar{s} \vee \bar{t})$$
$$r \rightarrow t$$
$$p$$

$$u$$

Number	Deduction	Rule + Previous Steps Utilized
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		

Note: You may not use all of the rows shown.