1. Review:

   (a) Fill out the truth table for the biconditional statement.

P	Q	$P \Leftrightarrow Q$
T	T	
T	F	
F	T	
F	F	

   (b) For **objects** A and B, how could you show that the statement below was **false**.

   $AB = 0$ if and only if $A = 0$ or $B = 0$.

   (c) Fill out DeMorgan's Laws

   $\sim (P \vee Q)$ is equivalent to _____

   $\sim (P \wedge Q)$ is equivalent to _____

2. Use a truth table to demonstrate that $\boxed{P \Rightarrow Q}$ is equivalent to $\boxed{\sim P \vee Q}$.

3. Use the equivalence above to rewrite the conditional statement in an equivalent form.

   If $f'(a) = 0$, then $f(a)$ is a maximum.

4. Prove that $\boxed{\sim (P \Rightarrow Q)}$ is equivalent to $\boxed{P \wedge \sim Q}$ by constructing a string of logical equivalences that start with $\sim (P \Rightarrow Q)$ and end with $P \wedge \sim Q$. Each step must be justified by a specific, already established and referenced, logical equivalence.

   A sample structure is below.

   Proof:

statement 1	=	statement 2	because justification 1
	=	statement 3	because justification 2
	=	statement 4	because justification 3

5. Think up your own favorite conditional statement that you know is **false.** Call this statement R. (So, $R : P \Rightarrow Q$.)

   (a) Write R as a sentence.

   (b) Write $\boxed{\sim R}$ as a sentence using both logical structures: $\boxed{\sim (P \Rightarrow Q)}$ and $\boxed{P \wedge \sim Q}$.

6. What ideas/concepts/skills do you think this worksheet was supposed to teach you?