Math 160A - Fall 2021 - Quiz #2 - Hand in by 9:30am, October 6.

Start Time: **Your name:**

Stop Time: **Integrity signature:**

Time limit 15 minutes. Please add explanation below if over 17 minutes total.

1. For each formula on the left, state which formula on the right it is tautologically equivalent to (if any). Write you answers on the lines.

____(a) $q \to p$.

____(b) $\neg q \vee \neg p$

____(c) $\neg(\neg q \to p)$

____(d) $(q \vee p) \wedge (\neg q \vee \neg p)$

1. $p \wedge \neg q$
2. $p \vee \neg q$
3. $\neg(p \wedge q)$
4. $\neg(p \vee q)$
5. $p \leftrightarrow \neg q$
6. $p \leftrightarrow q$
7. None of the above

2. Give a truth assignment that shows the following two formulas are not tautologically equivalent.

$$(p \wedge q) \to r \qquad \text{and} \qquad (p \to r) \wedge (q \to r).$$

3. Indicate whether True or False, by writing "T" or "F" on the lines. To be true, it must be true for all formulas A and all sets Γ of formulas.

____(a) If A is a tautology, then A is satisfiable.

____(b) If A is a satisfiable, then A is a tautology.

____(c) A is a tautology if and only $\neg A$ is satisfiable.

____(d) If $\Gamma \vDash A$ and $\Gamma \vDash \neg A$, then Γ is unsatisfiable.