**Mathematics 174**

**Quiz # 3** Name: Key

***You must show your work to get full credit.***

**1.** (a) Make the truth tables for $p \to q$ and $\sim p \vee q$.

| $p$ | $q$ | $p \to q$ |
|---|---|---|
| T | T | T |
| T | F | F |
| F | T | T |
| F | F | T |

| $p$ | $q$ | $\sim p$ | $\sim p \vee q$ |
|---|---|---|---|
| T | T | F | T |
| T | F | F | F |
| F | T | T | T |
| F | F | T | T |

(b) Explain why $p \to q$ and ~~$p \to q$~~ $\sim p \vee q$ are logically equivalent.

They have the same truth values (same values in the truth table)

**2.** (a) Make the truth tables for $\sim (p \to q)$ and $p \wedge \sim q$.

| $p$ | $q$ | $p \to q$ | $\sim (p \to q)$ |
|---|---|---|---|
| T | T | T | F |
| T | F | F | T |
| F | T | T | F |
| F | F | T | F |

| $p$ | $q$ | $\sim q$ | $p \wedge \sim q$ |
|---|---|---|---|
| T | T | F | F |
| T | F | T | T |
| F | T | F | F |
| F | F | T | F |

(b) Explain why $\sim (p \to q)$ and $p \wedge \sim q$ are logically equivalent.

same values in truth table or: use DeMorgans law

$\sim (p \to q) \equiv \sim (\sim p \vee q) \equiv (\sim \sim p) \wedge (\sim q)$

$\equiv p \wedge (\sim q)$

**3.** What is the negation of the statement: "If he is tall, he is a basket ball player."

"He is tall, but not a basket ball player".