Loyola University Chicago   **Quiz 1**
Math 201, Spring 2010

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You have 30 minutes. Show your work. Notes not allowed! Problems are on both sides of this sheet.

Problem 1. (4 pts) Write a truth table for the following expression:

$$(P\ OR\ NOT\ Q) \implies P.$$

Problem 2. (6 pts) Let P mean *I bike to work*, let Q mean *It is icy*, let R mean *My wrist hurts*. Write the following sentences using P, Q, R and connectives or vice-versa:

I biked to work when it was icy and now my wrist hurts.

$(Q\ OR\ R) \implies NOT\ P$

It is necessary that it be icy for me to bike to work.

Problem 3. (4 pts) Write the contrapositive and the converse of the statement below, and clearly say whether the contrapositive is true or false and the whether the converse is true or false:

$$\text{If } xy < 0 \text{ then } x < 0 \text{ or } y < 0.$$

Contrapositive:

Converse:

Problem 4. (6 pts) Prove that, for any sets A, B, and C,

$$A \setminus (B \cap C) = (A \setminus B) \cup (A \setminus C).$$

Note: $x \in T \setminus S$ means that $x \in T$ AND $x \notin S$. In the proof, you can use the fact that $P \text{ or } (Q \text{ and } R) \iff (P \text{ or } Q) \text{ and } (P \text{ or } R)$ and that $P \text{ and } (Q \text{ or } R) \iff (P \text{ and } Q) \text{ or } (P \text{ and } R)$, as long as you clearly state what statemets P, Q, and R are you applying these facts to.