

# Math 2283 - Introduction to Logic

## Quiz #9 - 2015.09.30 Solutions

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Consider the statement  $(K \cup L)' \subset K'$ .

1. Convert the statement from set notation to logical form, but using the element  $\in$  symbol along with sets  $K$  and  $L$ .

$$\sim (x \in K \cup L) \rightarrow \sim x \in K$$

or...

$$\sim (x \in K \vee x \in L) \rightarrow \sim x \in K$$

2. Convert your statement from part (a) into a purely logical form, using substitutions so that you have only statements  $p$  and  $q$ , and no  $\in$  symbols.

Letting  $p : x \in K$  and  $q : x \in L$ , we have

$$\sim (p \vee q) \rightarrow \sim p$$

3. Based on the form of the logical statement in (b), do you believe that the original set relation statement is true?

Yes, the hypothesis can be rewritten as  $\sim p \wedge \sim q$ , from which the conclusion follows immediately from the logical Law of And (Breaking Apart):  $p \wedge q \rightarrow p$ .