

Math 2283 - Introduction to Logic

Quiz #8 - 2016.02.03 Solutions

1. What is the difference between the *Rule of Replacement* and the *Rule of Substitution*?

The *Rule of Replacement* involves the logical relation of “=”, and in the case of $x = y$, allows us to replace anywhere we wish the object x by the object y , and vice versa, in another expression under this assumption.

The *Rule of Substitution* is a rule for replacing single logical variables such as p , q , and r systematically everywhere in a tautological sentential function by more complicated expressions, as long as it is done universally throughout the sentence in question.

2. State, in symbolic logic form, the *Rule of Detachment*.

$$[(p \rightarrow q) \wedge p] \rightarrow q$$

3. Assuming the sentence: $(p \wedge q) \rightarrow q$, explain why $[(p \vee q) \wedge (q \vee r)] \rightarrow (q \vee r)$ must also be true, using only three words.

Rule of Substitution

4. Assuming that $x = 5$ and $x^2 + 3xy - 4 = 0$ are true sentences, explain why $x^2 + 15y - 4 = 0$ must also be true, using only three words.

Rule of Replacement