

Mathematical Logic — Assignment One

November 7th, 2016

1. Prove that $\vdash (A \supset B) = (\neg B \supset \neg A)$.
2. Show that, in any bounded, distributive and complemented lattice, each element x has a unique complement.
3. The Law of Excluded Middle has been presented by means of the following inference rule:

$$\frac{}{A \vee \neg A} \text{lem}$$

for any formula A .

Consider instead the following inference rule:

$$\frac{}{x \vee \neg x} \text{lemr}$$

for any **variable** x .

Does the `lemr` inference rule allow to derive all the theorems of propositional logic?

Discuss the question and motivate your answer.

Each question is worth 12 points. The points in all the four assignments will be added together and the result will be divided by 4, and this will be the final result. Remember to mark your answer sheet with your name.