CMPT 489/980: Assignment #3

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1 Weakening in Classical

Prove that if $\Gamma \vdash \Delta$ and $\Gamma \subseteq \Gamma'$ and $\Delta \subseteq \Delta'$ then $\Gamma' \vdash \Delta'$.

2 Not Not LEM

Provide a derivation in intuitionstic logic for $\vdash \neg\neg(P \vee \neg P)$

3 LEM Implies Contradiction

Assume that intuitionistic logic has the following additional rule:

$$\frac{}{\Gamma \vdash \phi \vee \neg\phi}$$

Prove that for all ϕ, it is the case that $\vdash \neg\neg\phi$ implies $\vdash \phi$

4 Contradiction Implies LEM

Assume that intuitionistic logic has the following additional rule:

$$\frac{\Gamma \vdash \neg\neg\phi}{\Gamma \vdash \phi}$$

Prove that for all ϕ, it is the case that $\vdash \phi \vee \neg\phi$

5 Kind of Contradiction

Provide a derivation in intuitionstic logic for $\vdash \neg\neg\neg\phi \to \neg\phi$

6 Not Not True

Prove that, in intuitionistic logic, for all ϕ, it is the case that $\vdash \phi \to \neg\neg\phi$

7 Weakening in Intuitionistic

Prove that if $\Gamma \vdash \phi$ and $\Gamma \subseteq \Gamma'$ then $\Gamma' \vdash \phi$.