

INTRODUCTION TO LOGIC - HOMEWORK #7 - ~~DUE APRIL 21~~ due April 28

**1 DERIVATIONS USING NEGATION**

Construct derivations for the following formulas:

(a)  $(\neg\varphi \wedge \neg\psi) \rightarrow \neg(\psi \wedge \varphi)$

(b)  $(\neg\psi \wedge \psi) \rightarrow \neg\varphi$

(c)  $\neg\neg\neg\varphi \rightarrow \neg\varphi$  [**This one can be hard but do not give up!**]

*NB: You should use the notational convention that any negated formula  $\neg\varphi$  is the same as  $\varphi \rightarrow \perp$  (or in other words, replace anything that has a negation and looks like  $\neg\varphi$  with something that looks like  $\varphi \rightarrow \perp$ ).*

**2 DISJUNCTION**

(d) What is proof by cases? Give an example.

(e) Give a derivation of  $(\varphi \wedge \psi) \rightarrow (\varphi \vee \sigma)$