Logic for AI — Master 1 IFI
Class Assignment #3: Natural Deduction

Andrea G. B. Tettamanzi
Université côte d'Azur
andrea.tettamanzi@univ-cotedazur.fr

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1 Fitch System in Propositional Logic

Prove the following theorems using the Fitch system of natural deduction:

1. Hypothesis: q, $p \Rightarrow \neg q$; Thesis: $\neg p$
2. Hypothesis: $p \vee q$, $\neg p$; Thesis: q
3. Hypothesis: p; Thesis: $\neg\neg p$
4. Hypothesis: $\top$; Thesis: $(p \Rightarrow q) \Rightarrow (\neg q \Rightarrow \neg p)$

2 Fitch System in Predicate Logic

Prove the following theorems using the Fitch system of natural deduction:

1. Hypothesis: $\top$; Thesis: $\forall x \forall y P(x, y) \Rightarrow \forall y \forall x P(x, y)$
2. Hypothesis: $\forall x \exists y P(x, y)$, $\forall x \forall y (P(x, y) \Rightarrow P(y, x))$; Thesis: $\forall x \exists y (P(x, y) \wedge P(y, x))$