

Exercise sheet 4: First-Order Logic

Exercise 1

Prove the following first order statements in Isabelle:

1. $(\forall x. P x \longrightarrow Q) \longrightarrow (\exists x. P x \longrightarrow Q)$
2. $\forall x. \neg P x$, assuming that $\neg \exists x. P x$ is true
3. $\exists x. \neg P x$, assuming that $\neg \forall x. P x$ is true

Exercise 2

Give tree representation proofs for the statements in Exercise 1, annotating your steps using the Isabelle names of rules (e.g. allI, exI, etc).