Exercise 1

Prove the following first order statements in Isabelle:

1. \((\forall x. P x \rightarrow Q) \rightarrow (\exists x. P x \rightarrow Q)\)
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).