4 Discrete Mathematics I (SS)

(a) Write down the introduction and elimination rules for the universal quantifier (\(\forall\)), the existential quantifier (\(\exists\)) and negation (\(\neg\)) in structured proof.

(b) Write down the introduction rule for implication (\(\implies\)) in structured proof.

(c) Write down a structured proof of the following sentence.

\[
(\forall x. \neg P(x)) \implies \neg \exists x. P(x)
\]

(d) Write down a structured proof of the following sentence. Clearly state any proof rules that you use in addition to those included in part (a) and part (b).

\[
(\neg \forall x. \neg P(x)) \implies \exists x. P(x)
\]