

Homework 9

MATH 461

(due April 12)

April 9, 2024

Problem 1. Prove that if α, β are any WFF's, then

$$(\forall x(\alpha \rightarrow \beta) \rightarrow (\forall x\alpha \rightarrow \forall x\beta))$$

is valid.

Problem 2. Prove that if P is a binary predicate symbol, then

$$(x = y \rightarrow (P(x, z) \rightarrow P(y, z)))$$

is valid.

Problem 3. Prove that if $\Gamma \vdash \alpha_1$ and $\Gamma \vdash \alpha_1 \rightarrow \alpha_2$ then $\Gamma \vdash \alpha_2$

Problem 4. Show that $\vdash \exists v_1 P(v_1) \rightarrow \exists v_2 P(v_2)$

[Small Hint: Start your deduction with $\forall v_2 \neg P(v_2) \rightarrow \neg P(v_1)$ (justify it!). At some point you should use the generalization theorem.]