Name: POSSIBLE ANSWERS

Math 160A - Winter 2002 - Quiz #5

Instructor: Sam Buss - UCSD - March 11, 2002

Give examples (counter-examples) of structures which prove the following three statements. Be sure to describe explicitly the universe and the interpretation of each non-logical symbol.

1. $\exists x \forall y P(y,x) \not\models \exists x \forall y P(x,y)$.

2. $\forall x \exists y (y \leq x) \not\models \exists x \forall y (x \leq y)$.

3. $\forall x (f(x) \leq x) \not\models \exists x \forall y (x \leq y)$.

Possible answers:

1. *Let* $|\mathfrak{A}| = \{0,1\}$ *and* $P^{\mathfrak{A}} = \{\langle 0,1\rangle, \langle 1,1\rangle\}$.

2. *Let* $\mathfrak{A} = (\mathbb{Z}, \leq)$ *where* $\leq$ *is the usual "less than or equal to".*

3. *Let* $\mathfrak{A} = (\mathbb{Z}, \leq, f^{\mathfrak{A}})$ *where* $\leq$ *is the usual "less than or equal to", and* $f^{\mathfrak{A}}(i) = i - 1$ *for all* i.