INFO I201
Quiz 8

Name:

Consider the first order language $\mathcal{L}$:

Constant Symbols: $0, 1$,
Predicate Symbols: $L(x, y)$,
Function Symbols: $s(x), p(x, y)$.

Consider the model $M = (\mathbb{Z}, I)$ where

- $I(0) = 0, I(1) = 1$
- $I(L) = \{(m, n) \mid m \leq n\}$
- $I(s)(n) = n + 1$ and $I(p)(m, n) = m + n$

Determine the truth value of the following formulas in this model:

1. $\forall x(L(x, 0) \longrightarrow L(0, s(x)))$
2. $\exists x(L(x, 0) \wedge L(0, s(s(x))))$
3. $\forall x \exists y L(x, y)$
4. $\exists x \forall y(\neg L(x, y) \vee L(s(x), s(y)))$
5. $\forall x(L(x, 0) \vee L(0, x))$