Computability Assignment
Year 2013/14 - Number 1

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1 Question

Define a binary property $p(x, y)$ over natural numbers that satisfies both the requisites:

1. $\forall x \in \mathbb{N}.\exists y \in \mathbb{N}.p(x, y)$ and

2. *it is false that* $\forall y \in \mathbb{N}.\exists x \in \mathbb{N}.p(x, y)$

Provide a definition for p, and a proof for the above claims.

1.1 Answer

$$p(x, y) := (x < y)$$

1.1.1 Proof

1. For any x it is always possible to find a greater number (e.g. $x + 1$)

2. For a given y it is not always possible to find a smaller natural number. Assuming $y = 0$, it's not possible to find an $x \in \mathbb{N}.x < y$.