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

If we define the binary property $p(x, y)$ as "*successor*" in terms of natural numbers we have that *y is the successor of x*, or simply $y = x + 1$. This definition satisfies both the requisites, in particular:

1. for every natural number there exists a *successor* and

2. it is false that every natural number is the *successor* of another natural number (for example, zero has no precedessors)