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

$p(x, y) : x^2 - y = 0$

Let choose an abitrary $x \in \mathbb{N}$, we can always find $y = x^2 \in \mathbb{N}$ that satisfies $p(x, y)$. So the requisites (1) holds

We choose $y = 3 \in \mathbb{N}$, then according to the above $p(x, y)$, $x^2 - 3 = 0$. We cannot find $x \in \mathbb{N}$ that satisfies that equation. So (2) holds.