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) = { T if $\frac{x}{y}$ is defined , F otherwise}

For all $x \in \mathbb{N}$, we can always find $y \in \mathbb{N}$ such that x/y is defined. When x/y is defined it returns True. But for some $y \in \mathbb{N}$ we may not be able to find $x \in \mathbb{N}$ such that $\frac{x}{y}$ is defined. For exam when y = 0 , we can not find any x such that $\frac{x}{y}$ is defined. In such case the property returns F.