

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

1.1.1 Property

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

1.1.2 Proof

1. The set \mathbb{N} is an infinite set and $\forall x. x \in \mathbb{N} \Rightarrow \exists y. y = x + 1, y \in \mathbb{N}$
2. $y \in \mathbb{N}, y = 0 \Rightarrow \neg \exists x. x \in \mathbb{N}, x < y$