Computability Assignment
Year 2012/13 - Number 1

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1 Question

Define a binary property $p(x, y)$ over natural numbers such that we have both

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

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

1.1 Answer

$$p(x, y) = \begin{cases} 1 & x + 3 = y \\ 0 & otherwise \end{cases}$$

Given x, a value y that satisfies p exists. So statement 1 is true.

Now we try to demostrate that an y that satisfies the property p for all the value of x. We call this value z. But not all the x have the same value of z, because if z = x, then p(z+2, z) is false. So claim 2 is true.