Introduction to Mathematical Thinking

Tanvi Jakkampudi
Carnegie Mellon University

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Question 1

Say whether the following is true or false and support your answer by a proof.

$$(\exists m \in N)(\exists n \in N)(3m + 5n = 12)$$

Answer:

1. The natural numbers are $N = \{1, 2, 3, ...\}, (m, n) \in \mathbb{N}$
2. $f(m, n) = 3m + 5n = 12$

   $\therefore m \leq 4$ and $n \leq 2$
3. The possible values for m are $\{1, 2, 3, 4\}$ and n are $\{1, 2\}$
4. If $n = \{1, 2\}$ the values of m are $\{7/3,\ 2/3\}$ which are $\notin \mathbb{N}$,
5. If $m = \{1, 2, 3, 4\}$ the values of n are $\{9/5,\ 6/5,\ 3/5,\ 0\}$ which are $\notin \mathbb{N}$

$\therefore$ the statement made in the question is *FALSE*