# Proof 1

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

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

## Proof

By contradiction.

Let us assume the statement is **true**.

Therefore, $3m + 5n = 12$ must hold true.

$$\begin{aligned} & 3m + 5n = 12 \\ \implies & 3m = 12 - 5n \\ \implies & m = \frac{12 - 5n}{3} \end{aligned}$$

But for any natural multiple of $n$, $m$ would result in a rational or an integer.

But $m \in \mathbb{N}$. Contradiction.

Therefore, our initial assumption must be **false**. Hence, the statement is false.