

Test Flight Problem Set 1

Proposition: There exist $n, m \in \mathbb{N}$ such that $3m + 5n = 12$

The proposition is False

Proof by considering the cases $m \geq 3$, $n \geq 3$, and $n < 3$ and $m < 3$

Given $x \geq 1$ for all $x \in \mathbb{N}$

$m \geq 3$ implies $3m + 5n \geq 9 + 5 = 14 > 12$

The proposition is false in the case $m \geq 3$

$n \geq 3$ implies $3m + 5n \geq 3 + 15 = 18 > 12$

The proposition is false in the case $n \geq 3$

If $n < 3$ and $m < 3$ there are four cases:

If $m = 1, n = 1$ then $3m + 5n = 8 \neq 12$

If $m = 1, n = 2$ then $3m + 5n = 13 \neq 12$

If $m = 2, n = 1$ then $3m + 5n = 11 \neq 12$

If $m = 2, n = 2$ then $3m + 5n = 16 \neq 12$

The proposition is false in these four cases, completing the proof