1. True or False $(\exists m \in \mathbb{N})(\exists n \in \mathbb{N})(3m+5n=12)$

False.

Suppose the above statement is true, that is there exists such m and n so that $3m+5n=12$. Since $m, n \geq 1$, we can have x, y such that $x = m-1$, $y = n-1$. where $\{x \in \mathbb{Z} \mid x \geq 0\}$. $\{y \in \mathbb{Z} \mid y \geq 0\}$ and satisfies $3x + 5y = 4$, then we have $x = \frac{4-5y}{3}$. Since $x \geq 0$, we must have $y = 0$, thus $x = \frac{4}{3}$, which contradicts with the fact that x being an integer, thus the above statements is false.