Submission for the Test Flight Project for Introduction to Mathematical Thinking.

**Problem 1:**

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

**Proof:**     To rephrase the proposition: There exists a natural number $m$ and a natural number $n$ such that $3m + 5n = 12$. We observe that if $n > 2$ then $5n > 12$, so $n$ must necessarily equal to 1 or 2.

*Case 1:* Let $n = 1$. The equation can be rewritten as

$$3m + (5)(1) = 12$$

Solving for $m$ we have
$$3m = 7$$

or
$$m = \frac{7}{3}$$

which is not a natural number.

*Case 2:* Let $n = 2$. The equation can be rewritten as

$$3m + (5)(2) = 12$$

Solving for $m$ we have
$$3m = 2$$

or
$$m = \frac{2}{3}$$

which is also not a natural number.

Neither of these cases produces an $m$ which is a natural number, so the proposition must be false. □