Name: _____

Directions: All questions require explanation in English sentences.

1. [**2 parts, 2.5 points each**] Translate the following into formal mathematical language. Then, decide if the statement is true or false. Let E be the set of even integers, let P be the set of primes, and let $D(x, y)$ be "y is an integer multiple of x".

   (a) Whenever the sum of two integers is even, at least one of the summands is even.

   (b) There is no largest prime.

2. [**2 parts, 2.5 points each**] Translate the following formal statements into English, in the most natural way possible. Then, decide if the statement is true or false. Let E be the set of even integers, let P be the set of primes, and let $D(x, y)$ be "y is an integer multiple of x".

(a) $\forall x \in \mathbb{Z}. \, \forall y \in \mathbb{Z}. \, (x \in E \wedge x \notin E) \implies (x + y \notin E)$.

(b) $\exists a, b \in \mathbb{N}. \, \forall n \in \mathbb{N}. \, (D(a, n) \wedge D(b, n)) \implies D(ab, n)$