Name: _____

Directions: Show all work. No credit for answers without work.

1. [**2.5 points**] Let a, b, and c be integers. Prove that if $a \mid b$ and $b \mid c$, then $a \mid c$. Proofs should have complete sentences that explain why a claim is true; a proof is not just a jumble of mathematical equations and expressions.

2. [**2.5 points**] Let $a = 9169$, $b = 1007$, and let $d = \gcd(a, b)$. Use the extended Euclidean algorithm to compute d and integers u and v such that $d = ua + vb$.

3. [**2 parts, 2.5 points each**] Consider the following 1-person game, played on the number line. Initially, the player begins at 0. At each step, the player can move 525 units or 462 units in either direction.

   (a) What is the smallest positive integer on which the player can land, and why?

   (b) What is the smallest positive *even* integer on which the player can land, and why?