A Proof of GCD3

- 1. It suffices to assume that m and n are positive integers and d is any integers, and to prove that d divides both m and n iff d divides both m and n-m. PROOF: Since the gcd of two numbers is the largest integer that divides both of them, it suffices to show that m and n have the same common divisors as m and n-m.
- 2. If d divides both m and n, then d divides both m and n-m. PROOF: That d divides m follows from the assumptions; that it divides n-m follows from the assumptions and Lemma Div.
- 3. If d divides both m and n-m, then d divides both m and n.

 PROOF: That d divides m follows from the assumptions; that it divides n follows from the assumptions, Lemma Div, and the simple algebraic relation: n=m+(n-m).
- 4. Q.E.D.

PROOF: GCD3 follows from steps 1, 2, and 3.