

Name (print): _____ Signature: _____

You have 30 minutes. Show your work. Notes not allowed! Problems are on both sides of this sheet.

Problem 1. (5 pts) Prove that, given three integers a , b , and c , if $a|b$ and $b|c$, then $a|c$.

Problem 2. (5 pts) Find all pairs of nonnegative integers x and y such that $509x - 132y = 2$.

Problem 3. (5 pts) Your phone company charges 15 cents per minute for long distance calls within US and 39 cents per minute for calls to Europe. You receive a monthly bill for long distance calls shows \$16.70. Explain why this bill must be incorrect.

Problem 4*. (5 pts) Let a and b be nonzero integers. Show that $\gcd(a, b) = 1$ if and only if $\gcd(a, a + b) = 1$.