Class Problem
Math 2513
March 1, 2005

PROBLEM. Let a, b and c be positive integers.
Prove that *if c divides a then c divides ab.*

Solution: The statement to be proved is a simple implication whose hypothesis is "c divides a" and whose conclusion is "c divides ab". We will give a direct proof. This means that we will assume that c divides a and then use logical inference to show that c divides ab. The key definition is: *If m and n are integers and $m \neq 0$ then m divides n if there is an integer k such that $n = mk$.*

PROOF: Let a, b and c be integers. Assume that c divides a. By definition (of divides) this means that $c \neq 0$ and that there is an integer n such that $a = cn$. Then $ab = (cn)b = c(nb)$, and since nb is an integer (the product of integers is always an integer) it follows (by the definition of divides) that c divides ab. $\square$