Math 276 **Due January 23**

Homework Supplement 1

Definition If a and b are integers, $a \neq 0$, we say b *is divisible by* a or a *divides* b if there is an integer x so that $b = ax$.

1. In the following statements, suppose a, b, c, x, and y are integers.
(a) Show that if a divides b, then a divides bc.
(b) Prove that if a divides b and b divides c, then a divides c.
(c) Show: If a divides b and a divides c, then a divides $bx + cy$ for any integers x and y.

2. Use the fact that every integer is either even or it is odd to show that for all integers, n, the number $n^2 - n$ is divisible by 2.

3. Show that for each integer n, the number $n^3 - n$ is divisible by 3.

4. Give a direct proof of the assertion on the "Number Assumption" handout that if a and b are rational numbers, there is a rational number c so that $a < c < b$.

Note: The words "prove", "show", "demonstrate", etc. all mean the same thing in a math class.