Name (PRINTED): _____

Student ID #: _____

Section # (or TA's: name and time) _____

CMSC 250 Quiz #6 ANSWERS Wed., Mar. 1, 2006

Write all answers legibly in the space provided. The number of points possible for each question is indicated in square brackets – the total number of points on the quiz is 30, and you will have exactly 15 minutes to complete this quiz. You may not use calculators, textbooks or any other aids during this quiz.

1. [24 pnts.] Disprove by counter example or Prove each of the following:

   a. The product of any rational number with an integer is a rational number.

   Assume x is a rational number and y is an integer.
   Since x is rational, $\exists a, b \in Z,\ x = \frac{a}{b}$
   The product of x and y can be written as $y * \frac{a}{b}$
   After multiplying, the sum is $\frac{ya}{b}$
   Since $ya \in Z$ by closure of multiplication
   and $b \in Z$ because it was defined as such above, The product is an fraction of an integer over an integer which means that it is also rational by the definition of rational.

   b. For all integers n, if n is odd then n^2 is odd.

   Since n is an odd integer, $\exists a \in Z\ n = 2a + 1$ by the definition of odd.
   Since $n = 2a + 1$, $n^2 = (2a + 1)^2$.
   $(2a + 1)^2 = 4a^2 + 4a + 1 = 2(2a^2 + 2a) + 1$
   Since $2a^2 + 2a$ is an integer by closure of integers during addition and multiplication, n^2 is also even by the definition of even.

   c. For all integers n and m, $(n + m) > m$.

   False $n = -2$ and $m = 5$, $(n + m) = -2 + 5 = 3$ which is not greater than 5.

2. [6 pnts.] State Yes or No for each of the following (no justification for your answer is necessary). Assume a, b and c are integers and x, y and z are rationals for all of the following questions.

a. _____NO_____If a, b, and c are even, $\frac{a+b+c}{2}$ is also even.

b. _____NO_____$x + y \leq x \cdot y$

c. _____NO_____If $a > b$ and $x > y$, then $a \cdot x > b \cdot y$