MAT 147
Homework # 2

1. Recall that an integer n is **even** if it can be written as $n = 2k$ for some integer k, and n is **odd** if it can be written as $n = 2k + 1$ for some integer k. Use the properties of integers to verify the following statements:

(a) The sum of two even integers is an even integer.

(b) The sum of two odd integers is an even integer.

(c) The sum of an even integer and an odd integer is an odd integer.

2. If possible, find the multiplicative inverse for each of the following real numbes: $\sqrt{2}, 6, -3.5, 0, \frac{8}{9}$.

3. The **additive inverse** of a real number x is a number y such that $x + y = 0$. We usually write $-x$ (instead of y) for the additive inverse of x.

- If possible, find the additive inverse of each of the following real numbers: $\sqrt{2}, 6, -3.5, 0, \frac{8}{9}$. Is there any real number that does not have an additive inverse?
- We define **subtraction** of real numbers as $x - y = x + (-y)$. Is subtraction a commutative operation? That is, does $x - y = y - x$ for all real numbers x and y? If not, can you find a relationship between $x - y$ and $y - x$? Try some examples: 2-3 and 3-2, 7-10 and 10-7, etc.

4. Consider the following correspondences:

$$f : \mathbb{R} \to \mathbb{R} \text{ by } f(x) = x^3$$

$$g : \{a, b, c\} \to \{\$, \%, \#, \&\} \text{ by } g(a) = \$, g(b) = \# \text{ and } g(c) = \&.$$

$$h : \mathbb{Z} \to \mathbb{Z} \text{ by } h(n) = -2n.$$

Determine which of the functions above are one-to-one and which are onto.