Additional Problem Assignment 1

1. Remember that if a, b are integers (i.e. if $a, b \in \mathbb{Z}$) then a is said to divide b (written $a|b$) if there exists $k \in \mathbb{Z}$ such that $b = a \cdot k$.

   (a) Show that $a|a$ for all $a \in \mathbb{Z}$.

   (b) Show that if $a, b, c \in \mathbb{Z}$ and $a|b$ then $a|bc$.

   (c) Show that if $a, b, c \in \mathbb{Z}$ and if $a|b$ and $b|c$ then $a|c$.

   (d) Show that if $a, b, d, r, s \in \mathbb{Z}$ and if $d|a$ and $d|b$ then $d|ar + bs$.

2. Suppose A, B, C are sets. Give the definition of what it means that $A \subseteq B$ that is A is a subset of B.

3. Show by mathmeatical induction for all $n \in \mathbb{N}$, $2^n > n$. Remember that $N = \{1, 2, 3, \ldots\}$ is the set of natural numbers.