Introduction to Abstract Mathematics — Assignment 6.1
Fall 2013 — Due October 11

Exercise 1. Let $A = \{n \mid n = m^2 + m + 4 \text{ for some } m \in \mathbb{N}\}$ and $B = \{n \mid n \in \mathbb{N} \text{ and } 2|n\}$. Prove that $A \subseteq B$. Does $A = B$?

Exercise 2. Let $S = \{(m^2 - n^2, 2mn, m^2 + n^2) \mid m, n \in \mathbb{R}\}$ and $T = \{(a, b, c) \mid a, b, c \in \mathbb{R} \text{ and } a^2 + b^2 = c^2\}$. Show that $S \subseteq T$.

Exercise 3. Let X be a set and suppose that $a, b, c, d \in X$. How are a, b, c and d related if $\{\{a\}, \{a, b\}\} = \{\{c\}, \{c, d\}\}$? [*Note:* You'll need to consider the cases $a \neq b$ and $a = b$ separately.]

Exercise 4. Find (with proof!)10 elements of the set $G = \{p \in \mathbb{N} \mid p \text{ is an odd prime and } p = x^2 + y^2 \text{ for some } x, y \in \mathbb{Z}\}$.