ALGORITHM
Due Date: 9:20AM, October 11
Autumn, 2012

Homework 1

1. Write formal descriptions of the following sets.

   (a) The set containing the numbers 1, 10, and 100.

   (b) The set containing all integers that are greater than 5.

   (c) The set containing all natural numbers that are less than 5.

   (d) The set containing nothing at all.

2. Let A be the set $\{x, y, z\}$ and B be the set $\{x, y\}$.

   (a) Is A a subset of B?

   (b) What is $A \cup B$?

   (c) What is $A \cap B$?

   (d) What is $A \times B$?

   (e) What is the power set of B?

3. Find the error in the following proof that $2 = 1$.
   Consider the equation $a = b$. Multiply both sides by a to obtain $a^2 = ab$. Subtract b^2 from both sides to get $a^2 - b^2 = ab - b^2$. Now factor each side, $(a + b)(a - b) = b(a - b)$, and divide each side by $(a - b)$, to get $a + b = b$. Finally, let a and b equal 1, which shows that $2 = 1$.

4. Show that every graph with 2 or more nodes contains two nodes that have equal degrees.