Beginning Activities for Section 7.1
Mathematical Reasoning: Writing and Proof, Version 3

Beginning Activity 1 (The United States of America)

1. (a) $B = \{$Wisconsin, Indiana, Ohio$\}$ or $B = \{$Wisconsin, Indiana, Ohio, Michigan$\}$ depending on whether or not Michigan is considered to have a land border with itself.

    (b) $C = \{$Wisconsin, Indiana, Ohio$\}$ or $C = \{$Wisconsin, Indiana, Ohio, Michigan$\}$ depending on whether or not Michigan is considered to have a land border with itself.

    (c) $D = \{$Michigan, Minnesota, Iowa, Illinois$\}$ or $D = \{$Michigan, Minnesota, Iowa, Illinois, Wisconsin$\}$ depending on whether or not Wisconsin is considered to have a land border with itself.

2. Two examples are:

    (Michigan, Wisconsin) $\in R$, (Wisconsin, Iowa) $\in R$, but (Michigan, Iowa) $\notin R$.

    (Florida, Georgia) $\in R$, (Georgia, S. Carolina) $\in R$, but (Florida, S. Carolina) $\notin R$.

3. The statement, "For all x, $y \in A$, if $(x, y) \in R$, then $(y, x) \in R$." is true since if x and y have a land border in common, then y and x have a land border in common.

Beginning Activity 2 (The Solution Set of an Equation with Two Variables)

1. The ordered pairs $(2, 0)$, $(-2, 0)$, $(0, 4)$, $(0, -4)$, $\left(1, \sqrt{12}\right)$, $\left(1, -\sqrt{12}\right)$, $\left(-1, \sqrt{12}\right)$, and $\left(-1, -\sqrt{12}\right)$ are some of the ordered pairs in the solution set.

2. A point (a, b) in the coordinate plane is on the graph of the equation $4x^2 + y^2 = 16$ if and only if it is a solution of the equation. That is, if and only if $4a^2 + b^2 = 16$. In this sense, the graph of the equation is a representation of the solution set of this equation.

3. (a) $A = [-2, 2] = \{x \in \mathbb{R} \,|\, -2 \le x \le 2\}$.   Notice in each case, we used both interval nota-
                                                                           tion and set builder notation. Either one of these
    (b) $B = [-4, 4] = \{y \in \mathbb{R} \,|\, -4 \le y \le 4\}$.   notations is correct.