**Solutions: Homework 3 (section 2.2 of text)**

**11. Give a counterexample to the statement**

Solution: Let A = B = {0, 1}. Then Now |A| = 2, |B| = 2, and

Clearly

**14. Decide whether or not it is true that**

Solution: This is False. (Almost any choice of A, B, C, D will serve you well.)

Let A = C = Ø, the empty set and B = D = {1}.

Then

Thus

Note: Perhaps an easier way to view this is by letting A = B = [0, 1] and C = D = [1, 2], two intervals on the *real line*. (We know this is not a discrete set, but it works nonetheless.)

Then is a square in the plane; so is. But the union of these two squares is not a square, whereas the right-hand side of our set equality above is a square of side length 4.

(Draw a picture!)

**18**. **Write this in English: (Is it true?) What is the negation of this statement? (Is the negation true?)**

Solution: For every integer, *k*, divisible by 3, there exists a set of *k* counting numbers.

*This is not a true statement: just let k = -3.*

The negation says: There exists an integer, *k*, divisible by 3, such that no set of *k* counting numbers exists.

As a logical sentence, this negation is:

Clearly this is a true statement since it is the negation of a false statement.