Topic: 2.3 Algebraic Proofs

1. Yesterday we saw a lot of examples of algebraic properties that we assume are true. State each of them concisely.

   - Addition Property of Equality
   - Subtraction Property of Equality
   - Multiplication Property of Equality
   - Division Property of Equality
   - Commutative Property over Addition
   - Commutative Property over Multiplication
   - Associative Property over Addition
   - Associative Property over Multiplication
   - Distributive Property over Addition
   - Transitive Property
   - Reflexive Property

2. Notice in the list above the commutative, associative properties and missing subtraction and division. Does there exist a commutative and associative property over subtraction? What about division? Here's some examples to think about. Determine whether these are true or false.

   - $8 - 2 = 2 - 8$ If you are clever, there is a way to rewrite it so it works out.
   - $8 \div 2 = 2 \div 8$
   - $(3 - 8) - 2 = 3 - (8 - 2)$
   - $(3 \div 8) \div 2 = 3 \div (8 \div 2)$

3. Notice for the distributive property it is only addition. Would the 'Distributive property over Subtraction, Multiplication, and Division' hold? Here are some examples to think about. Determine whether these are true or false.

   - $3(8 - 2) = 3 \cdot 8 - 3 \cdot 2$
   - $3(8 \cdot 2) = 3 \cdot 8 \cdot 3 \cdot 2$
   - $3(8 \div 2) = 3 \cdot 8 \div 3 \cdot 2$

4. Write a two column proof (refer to yesterday's exploration) to solve the following:

$$3x + 5 = 6x + 17$$

5. Write a two column proof (refer to yesterday's exploration) to solve the following:

$$4(x - 5) = 1 + (99 + x)$$