The Language of Mathematics name _____
Exam 1 on Chapter 1. Spring 2006.

#	1	2	3	4	5	6	7	8	9	10	11	12	13	14	tot
pts	3	3	3	3	3	4	3	3	4	4	8	3	3	3	50

1. Write out the pronunciation of these expressions

a) $4(x - 5)$

b) $4x - 5$

c) $2 < x \leq 5$

2. Grammar. Something may be ungrammatical about these. If so, note what it is. If there is no grammatical error, say it is okay.

a) $2x = 12 = x = 6$ b) $x - 5 = 12$ iff $x = 17$ c) $2x = b$ iff $x = B/2$.

3. Here are some expressions that might be ambiguous. Use the algebraic conventions to evaluate the expressions.

a) -5^2 b) $\sqrt{9+16}$ c) $12/2+4$

4. Short answer.

a) Thinking of Mathematics as a language, which parts of speech are expressions?

b) What is the term for an example that proves a generalization is false?

c) Give an example of equivalence of sentences.

5. a) The symbol "=" can be used correctly two distinct ways. What are the two possible meanings? b) Give two examples, one of each, and be very clear which example has which meaning.

6. Note if the letter "x" is used as a placeholder (P) or not (N) in these sentences.

a) $x + a = b$ b) $x + a = a + x$

c) $(x + 1)^2 = x^2 + 2x + 1$ d) $x + a = b$ iff $x = b - a$

7. a) Define "identity."

b) What is the use or purpose of identities?

c) In the identity "$2(x + 4) = 2x + 8$," two things are the same and two things are not the same. Which two are not the same?

8. Here are two similar examples from arithmetic: 7 - 10 = -3. 12 - 16 = -4.
State, with letters, the method used to evaluate the expressions on the left in terms of simpler operations.

9. State, using letters, a theorem which asserts that subtraction of a number from both sides of an inequality yields an equivalent inequality.

10. State, as a fact, using letters, the method for simplifying all expressions similar to

$$\frac{3/5}{7/11} \quad \text{and} \quad \frac{\left(\frac{2}{9}\right)}{\left(\frac{3}{5}\right)}$$

11. (2 points each) True or false? [No reason required here, but see the next problem.]

a) T F $2x \geq x$

b) T F If $c > 0$ and $x > 0$, then $cx \geq x$

c) T F If $x < 18$, then $|x| < 18$.

d) T F If $|x| < 10$, then $x < 20$.

e) T F If $a < b$, then $ca < cb$

f) T F If $|c| > |b|$, then $c > b$.

g) T F $-100 < 2$.

h) T F $x = 5$ iff $x^2 = 25$.

12. Some of the above True/False questions are false. Pick three that are false and give counterexamples. Make it clear which three you are addressing and exactly what the counterexamples are.

13. Solve for x, exhibiting all steps one-by-one, $|x - 3| < 2$.

14. Solve for x, exhibiting all steps one-by-one: $-3x - 5 < 10$.