The Language of Mathematics Name _ Exam 2, on Chapter 2. Spring 2012.

1. (2 pts) Pronunciation. Write out, in English, how you would say these aloud.
a) {x | x > 3}
b) g(f(x))

- 2. (1 pt) Give the interval notation for
 a) {x | x ≥2}
- 3. (4 pts) Give a simplified notation for the given set a) $(4, 12] \cup (-3.2, 9)$
- b) (-3.2, 9)∩(4, 12]
- c) $[1.5.2.5)^{\circ}$
- d) $\{1, 2, 3, 4\} \cap (-\infty, 5]^{\circ}$

4. (2 pts) Each of the connectives *and*, *if..., then..., iff*, and *not* is used to define a set-theory term. Give the set theory term defined with
a) *and*b) *if..., then ...*c) *iff*d) *not*

b) $\{x \mid 3 \le x \le 9\}$

- 5. (3 pts) True or false?
- T F For any set $S, S \subset S$.
- T F $\{2, 4\} \subset (0, 4]$
- T F $2.5 \in \{n \mid 1 \le n \le 12\}$
- T F $2x \ge x$
- T F In the theorem " $\sqrt{x} = b \Rightarrow x = b^2$," the letter x is a placeholder.
- T F a = b iff ca = cb.

6. (2 pts) To the right sketch a Venn diagram (like the ones in the text with two circles and a surrounding box) for $S \cup T^c$. [Be sure to make the final region clear.]

7. (2 pts) Solve |x - 5| < 2.

8. (3 pts) The expression "2(x + 5)" can have two interpretations. Give examples of sentences with each and explain the meaning of each so well that I can be sure you understand them both.

9. (2 pts) State the **algebraic formulation** of the procedure used to evaluate "-11 - 15" in terms of simpler operations. [That is, state an identity with an appropriate problem-pattern and solution-pattern.]

10. (2 pts) State (like a theorem), the algebraic formulation of the method for the **first** step in solving this equation using the inverse-reverse method. [Do not solve it! Do what the problem asks!] $3(x^2 + 1) - 17 = 82$

11. Let
$$f(x) = \frac{3}{x}$$
. a) (1 pt) Give and simplify $f(2/x) =$

b) (3 pts) Solve for x: f(x - 1) = 5. Show all the steps, but do not bother to explain them.

12. (2 pts) Let f(x) = (x - 3)/4. What is the function that is defined by this definition?

13. (1 pt) Create a specific example that shows "a = b iff $a^2 = b^2$ " is false.

14. (3 pts) a) Make two equations that appear similar, one in which "x" is used as a placeholder, and one in which it is not. Make clear which is which.

b) Explain the essential difference. (Knowing the difference is not enough, you must explain it so someone who does not know will find it illuminating.)

15. (3 pts) Which of the following processes applied to both sides of an equation always produce an *equivalent* equation? (Circle the ones that do.) a) add 5 b) add x c) multiply by -5 d) square e) cancel a common factor of x f) multiply by x-2

^^^^ The upcoming algebra problems must be done step-by-step. Do not skip steps! At each step, state or **name the reason** (Rule) which justifies the step and **give the connective** for each step.[We are grading the justification and connectives, not just the solution!] 16. (3 pts) Solve for *x*, step-by-step: x(x - 5) = 2x.

17. (3 pts) Solve for x, step-by-step: $\sqrt{x-2} = x-4$

^^^^ Use algebra to set up and solve these two word problems. The correct answer with little or no supporting algebra will get little or no credit.

18. (4 pts) One square has sides twice as long as the sides of a smaller square. The larger square has 192 square inches more area than the smaller square. How long is the side of the smaller square? a) SET UP the relevant equation using algebra and "x".b) Then solve it.

19. (4 pts) Photocopies of a single original cost 6 cents each, no matter how many you make. Riesograph copies cost 50 cents for the setup and 2 cents each in addition (So, one copy would cost 52 cents, two would cost 54 cents, etc.).

a) If you make a thousand copies, which method is cheaper? [No details required.]b) Use algebraic notation to express the costs and SET UP the math to answer this question: How many copies would you have to make to have the Riesograph copying method be cheaper?c) Solve the algebraic problem you wrote for part (b).