Newberger, College Algebra 112-10, Spring 2005
Homework: Functions to words (and a little graphing).
Due Tuesday, February 8.

I. Models derived from geometry (with one variable).

A. Do problems #1, 3, 5, 11 on pages 302-303. Write your solution in a sentence or two that says

i. what the function models,
ii. what the formula is, and
iii. what each variable stands for.

For example, for #9, I might write, "A function that models the radius r of a circle in terms of its area A is given by $r(A) = \sqrt{A/\pi}$." You might have to make it two sentences if the situation is complicated. In addition to giving the verbal description of the function and the formula, draw a diagram showing the geometry of the situation (not too tiny). Include the variables in the diagrams if possible. Check your formulas in the back of the book.

B. Choose two even numbered problems from problems #2-18 on pages 302-303, and follow the instructions in IA.

C. Read problem #24 page 305. Do the following. You do not need to solve the problem as it is given in the book; just follow the instructions below.

- Draw a diagram (make it flat; the three dimensional one in the book is not very clear) of the area and the fence. Label the length of one side of the whole rectangular area x and the other side y.
- How long will the fence be in terms of x and y? Answer in a sentence.
- Now use the given information to solve for one of the variables in terms of the other.
- Write a function that models the area of the whole rectangle, and that has only one variable. Express your answer in a sentence or two like you did in IA.

D. Read the setup to problem #28 page 306.

i. Make a table with columns labelled, "the selling price per feeder," "profit per feeder," "number of feeders sold per week," and "profit per week." In the first row of the table, fill in the data when the selling price is \$10 per feeder. In the next rows of the table, fill in the data when the selling price is \$11 per feeder, \$12 per feeder, etc., continuing until you can tell what price they should charge per feeder to maximize the profit. Write a sentence explaining at what price they should sell the bird houses to make the most profit per week.

ii. Think about how you figured out what the weekly profit was given the selling price per feeder when you filled out the table. Find a formula for the function $p(x)$ that models weekly profit in terms of price x per bird feeder. For this function, you plug in price per feeder, and you get out profit per week. Express your answer in a sentence or two like you did in IA.

(Continued on the next page.)

II. Functions with more than one variable (a.k.a. sorting out a bunch of information at once).

A. Read problem #5 page 509. Now, read it again. Answer the following questions; either copy the question onto your homework, or answer in a sentence that indicates what the question was.

a. How many hours of carpentry is needed per chair? Express your answer as a ratio (with units hrs/chair (read hours per chair)).

b. How many hours of carpentry is needed if the manufacturer makes 5 chairs? 10 chairs?

c. Write a function $f(x)$ that models the number of hours of carpentry that is needed for the manufacturer to make x chairs.

d. Write a function $f(x, y)$ that models the number of hours of carpentry that is needed for the manufacturer to make x chairs and y tables (refer to the problem again to get the hrs/table ratio).

e. The function $f(x, y)$ in part II(A)d yields the number of hours of carpentry needed to make x chairs and y tables. What do we know about the function $f(x, y)$, from this information: "The manufacturer's employees can supply a maximum of 108 hours of carpentry work...per day"? Write your answer as an inequality.

f. Write a function $g(x, y)$ that models time (in hours) of finishing that is needed for the manufacturer to make x chairs and y tables.

g. Write an inequality based on the information that the manufacturer's employees can supply a maximum of 20 hours of finishing per day.

h. Write a function $p(x, y)$ that models the profit if the manufacturer makes x chairs and y tables.

i. Don't worry about answering the question in the book for this problem yet. We will get to that soon.

B. Read problem #6 on page 509. Answer the following questions; either copy the questions onto your homework, or answer in a sentence that indicates what the question was.

a. What is the largest number of houses that the contractor could build in this situation? (Hint: how many lots are there?) Write an inequality using this information if the contractor builds x colonial houses and y ranch houses.

b. How much capital is needed per colonial house? Express your answer as a ratio (with units \$/colonial).

c. How much capital is needed to build 10 colonial houses? 20 colonial houses? Write a function $c(x)$ that models the amount of capital needed to build x colonial houses.

d. Write a function $c(x, y)$ that models the amount of capital needed to build x colonial houses and y ranch houses.

e. Use this information and the function $c(x, y)$ to create an inequality: the contractor has \$3.6 million on hand. (An easy way to write 3.6 million is to write 3.6×10^6; another way is to write 3,600,000.)

f. Write the function $p(x, y)$ that models the profit that the contractor earns if x colonial houses are built and y ranch houses are built.

III. Graph the system of inequalities given in #3 page 509. Label all of the vertices (corners) of the region with coordinates. You can check that your graph is right in the back of the book, but the coordinate labels are not given.