

## **Math 1101 – Mathematical Modeling**

**Crauder, Evans and Noell's *Functions and Change, A Modeling Approach to College Algebra*, 3<sup>rd</sup> ed.  
Lecture Notes for Chapter 1, "Functions"**

A lot of this chapter is a review of material you've seen in previous algebra courses. Where this knowledge is used in conjunction with your study of mathematical modeling, I expect you to be able to work with these concepts from algebra. The specific topic of this chapter, functions, is examined in four different ways: via formulas, tables, graphs, and words.

You are encouraged to begin using WebAssign with this chapter (if you didn't get around to doing so for Chapter P the first day of class!), to become familiar with how it works. There is required homework in WebAssign that is patterned off the exercises at the end of each section of the textbook, and this can be of great benefit to you both in sharpening your algebra skills and learning the paradigm of WebAssign for homework. Don't fool yourself! Algebra is a necessary prerequisite for the study of mathematical modeling.

### **Some thoughts about having a regular routine of study, so that you can be successful in this course:**

The authors have used every tool of modern publishing to draw your attention to the important concepts: italics, colored ink, pictures, arrows, etc. But if you don't regularly crack your book to study after every lecture, they're not going to do you any good! And, when you register and activate your subscription to [www.webassign.net](http://www.webassign.net), you'll find that this online supplement to the textbook provides extra opportunities that further explain important concepts and test your comprehension of them.

The authors of the textbook have produced an excellent suite of exercises to thoroughly test your understanding of the material in each section of the book. The answers for the odd-numbered activities appear in the back of your textbook. WebAssign is full of resources to assist you in gaining the knowledge required by this course for the subject of mathematical modeling. Questions about homework activities (online or in the book) are legitimate questions to ask in class.

These post-lecture pages (one file for each chapter of the book) will be embellished with notes as the semester progresses, so be sure to come back to them often, especially as the date of a test or the final exam approaches.

### **Notes after Class Meeting #2, Thursday, August 20, 2009**

Section 1.1 covers familiar ground: using functions defined by formulas in order to answer questions about the output (the "y-values") of the function. There are both skill-based exercises (that give you the formulas and you just use them to answer specific questions). And there are applications exercises which may or may not explicitly give the underlying formula, but which certainly give you enough explanation of some natural situation so that you can construct the formula and calculate what is being asked for.

If there is any doubt about the meaning of math notation (such as  $f(x)$ ) you must be sure to pipe up in class and ask questions. No question is too trivial to raise in class! In the exercises at the end of Section 1.1, I truly want each of you to become a more discerning human being in the area of dealing with car salespersons, and not get rooked! That's the true value of examining exercise 12 on page 31. Be sure to review that one, and use the formula for the monthly payment to compare the two "deals" being offered. And be sure to understand that the "\$2,000 rebate" in one of the deals doesn't actually flow into your wallet; oh, no! That just reduces the amount to be financed at the "sweetheart" low APR of 3.9%. So you see, one fortunate outcome of this class is that you'll be able to deal more effectively when you go to buy a car next time.

The TI-83/84 calculator is going to be your steady companion and friend this semester. Get familiar with it, and learn to be its master. It's just a mass of stupid plastic and silicon; it takes your intelligence to make it work. Don't forget about the principle of "order of operations" and how sometimes parentheses must be inserted in order to make it calculate the right answer. Learn about a few tricks such as I demonstrated in class: storage of values into memory storage, and use of the "2nd" key to invoke certain useful facilities, such as being able to call back previous strings of keystrokes so you don't have to keep keying them in.

### **Notes after Class Meeting #3, Tuesday, August 25, 2007**

In Section 1.2, the focus is on functions presented via tables. An important annual publication, the federal government's Statistical Abstract of the United States, that has a wealth of useful and interesting data displayed in tabular form is mentioned on page 36 in Example 1.3. These days, it's available via the Internet through the website [www.census.gov](http://www.census.gov) (the link is at the bottom of that webpage). I'm sure that you'll have an opportunity to refer to this semester, perhaps for a group project or a take-home quiz!

Tables suffer from a paucity of data ... we've got to interpolate or extrapolate at times. This is done using the algebraic principle of "rate of change." (That means you can then proportionately interpolate between two values. This actually gets into the realms of calculus, but the authors trust your abilities enough to talk about that in the blue-background material on page 41. Enjoy!) If all you want to do is estimate a value that would lie exactly midway between two given table entries, then the famous "average" will do the trick. Another topic that's exposed in this section is the idea of trends, especially ones like that seen with the growth of yeast on page 38, which introduces the notion of a "limiting value." Be sure to note that.

Continue to get friendly with your calculator. Practice entering data into the lists L1 and L2, and creating a plot (graph) of that data.

Next time we'll talk about Sections 1.3 and 1.4: functions via graphs and words. See you there in class on Tuesday!

#### **Notes after Class Meeting #4, Thursday, August 27, 2007**

Today I spent more time talking about using the graphing calculator. Pending your time outside of class, learning how to input tables (using the STAT key and its EDIT menu) into the standard lists (L1 and L2), and looking at a plot of the points, is an essential skill needed for success in this introductory course to mathematical modeling.

I led the class through a discussion of translating functions described in words into their equivalent form as functions described by equations. This, too, is an essential skill, since words are how much of our functions come to us. I highly recommend reading a couple of webpages that speak to the steps to successfully doing that translation. The first of the pair can be found by going to <http://www.purplemath.com/modules/translat.htm>, which has a great listing that shows how various words translate to the basic arithmetical operations of addition, subtraction, multiplication, and division (as well as the all-important symbol for equations, “=”). At the bottom of that page is a continuation link to the second page of the pair.

We’ll investigate the translation of words into functional equations next Tuesday. We’ll also get into the first section of Chapter 2 of the text book, which deals with the analysis of data that’s displayed via graphs and tables.

The first several homework assignments will be due this Wednesday at midnight. I’m quite concerned about those who have not even set up their access to the homework, since that means they haven’t even looked at it! They really need to get to work, fast!