

Math 1101 – Mathematical Modeling

**Crauder, Evans and Noell's *Functions and Change, A Modeling Approach to College Algebra, 3rd ed.*
Lecture Notes for Chapter 2, "Graphical and Tabular Analysis"**

You'll find that an important message of this course is that words are important. You will be expected to be able to communicate with sentences. While the correct *number* is of course important, that's not the entire answer. You must supply the proper words that give that number what I call "personality." Without the words, the numbers are just so much garbage.

Notes after Class Meeting #5, Tuesday, September 1, 2009

The major item for today's class was to form into groups that I had assigned each person to, and work on two questions from the book. The first one came from page 83 of the text, #6, about the cost of preparing a letter. The second one came from page 125 of the text, #6, about the amount of vegetation eaten by one sheep in one day. These questions were intended to serve as a training ground for using the graphing calculator. They also serve as a training ground for what I say in the first paragraph on this page: learning how to navigate with words, and to express mathematical findings with words.

It provided an opportunity for those who like to talk, to talk! And it provided an opportunity to get to know others in the class. That's an important thing in a class where some people are uncomfortable with the subject matter (it's math, after all!). I picked up the work at the end of the class and took it home to read it over. Then I reminded everyone that the first few homework assignments in WebAssign would be due by midnight.

Notes after Class Meeting #6, Thursday, September 3, 2009

Today's class covered the material in the first two sections of the chapter. I spent a lot of time going over the successful operation of the TI graphing calculator. I'm especially interested that people do not get frustrated when attempting to display a graph. I showed techniques for automatically adjusting the vertical extents of the displayed window so that it contains at least a portion of the graph that can be used as a starting point to manually refine the graphing window.

The topic about trends was covered, using the terminology of limits. This is an important topic for Question 2 on the classroom project which was begun last time, and was completed this class period.

The class formed back up into the groups of last time, to complete working on those two questions. I handed back the original papers from Tuesday, after some important remarks about what I'd seen, especially about the need to provide words to describe what the numbers and other mathematical notation meant in the context of the questions. That's an important place to concentrate your attention.

Notes after Class Meeting #7, Tuesday, September 8, 2009

I went over the major problems I'd found on the in-class project — and again, the major problem is the lack of precision with words. Especially, it's important to understand the words, "Express using functional notation ...". I used Exercise #2 on page 141 to beat this to death! In this item, where the formula is given as $J = 11 - 2.5P$, the first part of the question asked this: "Express

using functional notation the number of cans sold weekly if the price of a can is \$1.40, and then calculate that value.”

Well, everyone was hot to trot to “calculate that value.” But whoa! I stopped reading at the comma, and only wanted to talk about expressing the number of can when the price is \$1.40 — and that simply means to write down this notation: $J(1.40)$. Later on, of course, it’s seen that $J(1.40) = 7.50$... if all you’re interested in is numbers. But it’s important to instead write this: $J(1.40) = 7.50$ thousand cans when the price is \$1.40 per can. Writing simply 7.50 as the answer is ridiculous, because no one reading what you’ve written has any appreciation for what it is you’re trying to talk about!

I shared with the class the number of points each group (and member of each group) earned from the mini-project. And I detailed how this will be counted as the first in-class “quiz” — there will be at least 5 quizzes during the semester, and assuredly more than 5. The top 5 quiz grades will be what’s added to each student’s running point total for the semester.

I finished up by not only covering Section 2.3 (Solving Linear Equations) but also spending time talking about Section 2.4 (Solving Nonlinear Equations). I showed more about the use of the calculator to solve nonlinear equations, essentially duplicating what’s already written in the text by the authors. But it’s important for folks to bring calculators to class and try these things out, so that later back home they can do those things on their own.

I closed the day’s class by commending some of the book’s exercises for everyone to study, in order to be able to discuss them on Thursday. Those are: Section 2.3, #2, 8, & 11; and Section 2.4, #6, 12, & 18. On Thursday I’ll lecture (as the syllabus promises!) on Sections 2.4 and Section 2.5.

The test is on Thursday of next week. The practice test (and an annotated version of it, as well) are now available on the website I have made available to the class.

Notes after Class Meeting #8, Thursday, September 10, 2009

Section 2.5 deals with finding where a function reaches a high spot (all such places are call “maxima”) or a low spot (“minima”). (Naturally, the singular terms are “maximum” and “minimum,” respectively). Since they are only “extremal” (a generic term for being either maximal or minimal) in a portion of the graph (their “neighborhood”), they don’t necessarily represent the absolute high-point — or low-point — of the graph. Usually, you’ll be asked the height (“y-value”) of the function at maxima or minima, so pay close attention to the wording in case you’re also supposed to specify the relevant x-value for the extreme point.

The graphing calculator is the way to find such points. Sometimes, the statement of the question you’re being asked will restrict the search to a portion of the domain. Graph the function and specify the window settings so that the Xmin and Xmax are set to conform to that portion of the domain. Then use the Minimum or Maximum choices from the very hand Calc menu to pinpoint the information you’re looking for. You’ll be asked three questions: the Left Bound (an x-value less than the location of the extreme point) of the search, the Right Bound, and then whether you want to also give a specific starting point for the search. The calculator then marks the location of the extreme point and reports its coordinates. Very easy!

This topic is very relevant to many situations, such as: “When will the fever break?” “How high will the projectile reach?” “What’s the highest speed the vehicle will reach?” “When will the unemployment rate reach its low point?”

Study the practice test! The real test is next Thursday in class. And don’t forget: all homework is due by Wednesday night at midnight. Strive to answer everything correctly. If you don’t use every tool at your disposal to maximize your homework experience, then I’m saddened by that lack of will to succeed. Every point you gain in homework also helps you to better understand the material and prepares you for the upcoming test.

Notes after Class Meeting #9, Tuesday, September 15, 2009

We had a lot of good Q&A in today’s class, which was devoted entirely to reviewing the material in Chapters P, 1, and 2 — as well as all the homework that is due tomorrow night (Wednesday) before midnight. Remember, WebAssign this week is a bit hobbled by capacity issues, and they may not be resolved before your homework is due. That’s why it’s so important to work on your homework right now, rather than waiting until the last minute.

See you Thursday for the first test of the semester! Send me email if you need help before the test, or visit me in my office (see the syllabus for location info), or visit the Math Lab on the 4th floor of the library and ask them questions. Don’t waste this opportunity to have a great outcome on the test!

Notes after Class Meeting #10, Thursday, September 17, 2009

Today was the day the first test was given. Remember: as specified in the syllabus, the lowest test grade will be replaced with the percentage made on the student’s final exam, if that would improve the low test grade.