Chapter 1 & 2.1, 2.2 Suggestions

Week 3

LAB DAY: There are two activities for this week's lab:
1) Teach/review the basics of the graphing calculator;
2) Do the distance match CBR activity with students.

1) Calculator skills: Typically, about 1/3 of our students consider themselves beginners on the graphing calculator, so it's probably wise to start with the basics. A list of beginner topics (***Graphing Calculator Basics)*** is available on the Instructor site. If time permits, you might also discuss ***Making a scatterplot on the TI,*** also available on the site. This latter file includes directions for entering data in the LIST**.** Give yourself ample time for the DISTANCE MATCH LAB, however (30 min.)

2) DISTANCE MATCH CBR lab. Details are available on the Instructor site under CBR (Motion detector). "CBR" is an acronym for "Calculator Based Ranger" and is marketed by Texas Instruments. The student pages are also on the students' BLACKBOARD site. For most of the year, the CBRs and viewscreens are stored in the lower cabinet in the third floor copy room. CBRs are on the top shelf in 2 bags; viewscreens on the bottom.) During "CBR season," however, I will store a viewscreen and the CBRs under the teacher station in 108. Please be sure everything is in order when you finish using them. Please do NOT wrap the cords around the CBRs. If you have any trouble with this equipment, please let me know. For the Distance Match lab, only you (not the students) will be using the equipment.

A word of advice: if you haven't done so already, you need to practice this lab yourself before you do it with your students. You might borrow a CBR the week before our lab for ***one night*** to get a feel for the equipment.

Sec 1.1 Introduction to Functions

Goals for students;
- Get a feel for the notion of inputs and outputs, with one variable dependent on the other
- Identify dependent and independent variable in a given scenario
- Correctly use function notation
- Identify domains and ranges of functions

I like to start this section with the application problems. A good rule of thumb is to begin with something with which students are familiar, i.e. something concrete and understandable, then generalize to the mathematical notation and concepts behind the scenario.

For example, you might start with scenarios like those on pp. 42-44 in the handbook. Having the data in your graphing calculator ahead of time would save a great deal of class time. You can download programs from me that will quickly place the data in your lists. See me if interested.

- *What two things are changing in this scenario? These are the variables*
- *Which one would do you think depends upon the other*
- *Are the outputs increasing or decreasing?*

Try to familiarize students with the notion of inputs and outputs -- with the output depending upon the input. You might introduce function notation gradually, not using it right away. For example, you might say something like "Temperature depends upon time and Temp =" , then gradually introduce *T(m)* notation, perhaps joking that this is the "lazy way out" (less writing). After writing "*Temperature(minutes*)" a few times, they are happy to write *T(m).* Be sure to emphasize that the notation in parenthesis gives the *independent variable* and that this notation does NOT REFER TO MULTIPLICATION, but is taken as a whole to mean the *output* of the process that is the function.

You'll barely have time to introduce domain and range, but you might introduce these topics by using the exploration on pp. 48-49 in the Handbook. You might ask, for example, "What values of the input make sense in the problem?" Be sure , then, to refer students to the excellent examples on pp. 50-52 (in the Handbook). Be sure to assign p. 55 in the HB for homework

Suggested Homework: ***MLP:*** **HW 1.1; Handbook: p. 55**

Sec 1.2 Graphs of functions

Goals for students**:**

- Graph a function by hand, using a table of values
- Correctly interpret a given graph as a relationship between two varying quantities
- Use the graphing calculator to graph a function using an appropriate viewing window, make a stat plot, and find function values
- Interpret function values in context, particularly when the input values are realigned

As a small group in-class activity, you might ask students to work on the activity on p. 53 in the Handbook. You might relate this activity to this week's "Distance Match" lab. Some students mistake a graph for a picture of what's actually happening rather than a relationship between two varying quantities.

I'll probably sketch a few graphs by hand, then reinforce the basics of graphing calculator, time permitting. I'll probably not get to scatterplots on the TI today, but if you do, you can have students try #27, 29, and #53 on pp. 38-41.

Suggested Homework: ***MLP:*** **HW 1.2**

Week 4

LAB DAY: Again we have two goals for today's lab:

Walking Student lab. All the details for today's lab are on the Instructor site under **CBR (motion detector).** Please work through this lab yourself before going to your lab. This lab is different than last week's in that students, themselves, will be using the CBRs.

Sec. 1.3 Linear Functions

Goals for students:

- Given two points, find the slope of the line containing them
- Given two points in a real world context, find and interpret the slope of the linear function containing them
- Understand that slope represents a constant rate of change
- Given a function in symbolic form, determine if the function is linear
- Identify and interpret the slope and y-intercept of a linear function given in symbolic form
- Given a function in symbolic form, find the *x*- and *y*-intercepts.

Start with two points and ask students to find the slope of the line between them. Review the formula for finding slope and let students try several traditional examples. (This skill is a review for most students.) Then introduce an example in context, like #53 on page 58. Let students find the slope, then develop the notion of interpreting it in context. Here emphasize that slope is a rate of change: $\frac{\text{Change in dependent variable}}{\text{Change in independent variable}}$. For #53, we might write $\frac{\Delta \text{ depreciation}}{\Delta \text{ time}}$ and say, "Each year the value of the property decreases by \$61,000."
I would then continue with other in context examples, like #54 – 56.

A real world scenario, like example 5on p. 50 is one way to intuitively develop the slope-intercept form of a linear function. Another simpler example might be the following:

> *For female infants at birth, the median weight is 7 pounds. If the babies grow an average of 1.5 pounds per month, write a mathematical model representing this scenario.*

To develop students' understanding of the slope-intercept form of a line , you might try making a table of values for the babies' weight (*W*) as a function of age (*m* for months).

Age, *m*, in months	**Weight, *W*, in pounds**
0	7
1	$7+1.5$
2	$7+1.5+1.5=7+(2)1.5$
3	$7+(3)1.5$
…	…
m	$7+(m)1.5$

Students will (hopefully) see that the coefficient of the independent variable, *m*, represents the average rate of change and the constant represents the initial value.

Activities in the handbook (pp. 57-60) are also good.
You might use "Interpret slope" exercises on p. 64 in the Handbook to strengthen interpretation skills.
You might want to use the file "Data tables" on p. 65 in the Handbook to develop skill in identifying linear data. Then discuss the y-intercept as initial value and time permitting, develop the procedures for finding intercepts.

Suggested Homework: ***MML:*** **HW 1.3;**
ASSIGN LINEAR PROJECT

Sec 1.4 Day 1 Equations of Lines (Skill day)
Goals for students:

- Given the slope and y-intercept of a linear function, write its equation
- Given two points, write the equation of the line passing through them
- Write the equation of a line parallel or perpendicular to a given line
- Determine if a given data set is linear (IMPORTANT FOR STUDENT PROJECTS)

Building on what we did in class yesterday, develop students' skill in writing equations for lines. Nice set of examples in the HB on pp. 61 – 63.

Suggested Homework: ***MML:*** **HW 1.4A**

Sec 1.4 Day 2: Equations of Lines
Goals for students:

- Given an initial value and average rate of change in context, write a linear model.
- Given two data points in context, write a linear model.

Continue with the concepts developed over the last two days, except now we are back in context.

Suggested Homework: ***MML:*** **HW 1.4B**

Week 5

LAB DAY: A normal class day this week. Do meet in the lab, however.

Day 1*: Sec. 2.1: Algebraic solutions of Linear Equations*
Goals for students:

- Solve linear equations (including those with fractions) algebraically
- Understand that the solution to $f(x) = 0$ is the same as the x-intercept of the graph of $f(x)$, which is the same as the zero of the function, f.
- Solve linear equations in context.

Students actually don't have too much trouble solving equations like those in the skill check, so a quick review would suffice. You will need to carefully develop the connections between solutions, x-intercepts, and zero of functions, however. Try to take a natural approach, perhaps asking such questions as:

If we set $f(x) = 15x - 60$ *equal to 0, which coordinates are we setting to 0, the x- or the y- ? How does this relate to the graph of the function? (When the y- coordinate is 0, where is the point on the graph?)*

In this way, you will review the meaning of function notation (*f(x)* is the output). You will need, then, to define the term, *zero* of a function, since it will be new to most students.

Since equation solving is a review for students, you might spend the most time solving the problems in context, like #43-76, perhaps asking volunteer students to come to the board.

If time allows, you can introduce the graphical method of solving equations. You have a couple options here. You can use the ZOOM BOX feature of the graphing calculator, or use the 2nd TRACE – ZERO method. Please stop by my office if you are uncertain of these calculator techniques.

Suggested Homework: ***MML:*** **HW 2.1**
If you get to solutions by graphing, assign: #25-32 on p. 100

Day 2. ***Section 2.2 Fitting Lines to data points***

This section introduces students to the regression feature on the graphing calculator. This is a good time to reinforce the fact that a linear function has a constant rate of change. Also, if you haven't already done so, this is a good time to teach students how to make a scatterplot.

Suggested Homework: ***MML:*** **HW 2.2**

Day 3. ***Section 2.2, cont'd/Review***

If you are in the lab on Day 3, you might have students work through the practice exam on MLP. If not, they can either work more of the problems in 2.2 or work on the chapter reviews on pp. 79-82 and 152-154 (up to #31).

Either way, be sure students know that there is a practice exam for students on MLP as well as a practice HW set.

Day 4. ***Exam on Chapter & 2.1, 2.2.*** An updated sample is on the Instructor site. Please change the problems somewhat, since the exam was used during a previous semester and is probably available to many students in fraternity or sorority exam files. Thanks.