1.1 – 1.3

1.1 – Four Ways to Represent a Function
1.2 – Mathematical Models: A Catalog of Essential Functions
1.3 – New Functions from Old Functions: Shifting and Stretching Essential Functions

Be sure to follow College Algebra formatting guidelines in your work. They're the same for us as they are for College Algebra, except we're "2410" and not "1340," so "2410" in the top left corner, not "1340."

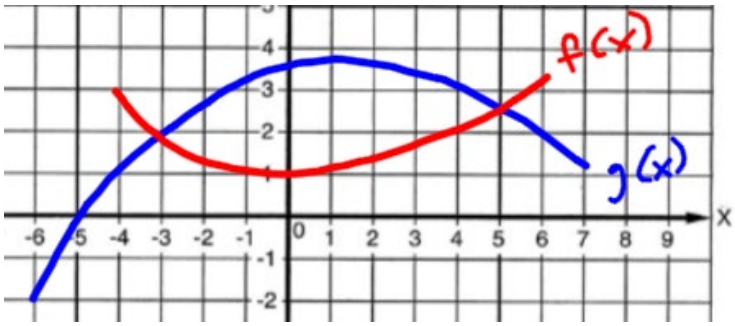
Resources:

- Homework Videos on harryzaims.com: https://harryzaims.com/public_html /
- Use Classlist on the Course Shell to ask me questions in e-mail.
- Call me at 970-290-0550 and I'll open up my office and we can meet any time, if you're in a hurry, and you missed the regular office hours. I enjoy a great deal of schedule flexibility, so this on-demand feature is something I can offer without much difficulty.

I have added some thoughts at the end of the assignment. It turned into a crappy essay, but I'm leaving it in. I would be pleased if you enjoyed or learned anything from "Grunt" and "Hand-In" discussion, but I think it may just be a case of my over-sharing my thought process.

"Write much. Think little." That's always been *my* mantra. It carried me over quite a few rough patches in my learning, where things didn't come to me as easily as they seemed to come to other people. Usually, I was fairly quick, but when I wasn't, I had to grind. I had to write a lot extra.

1. (5 pts) Answer the following questions about f and g, from the graph:

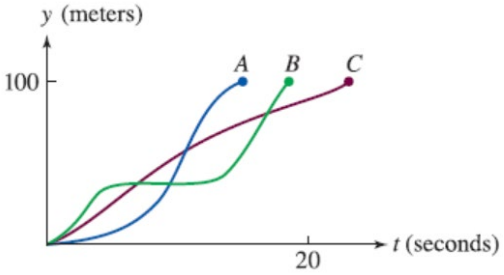


a. What's the value of $f(0)$?
b. What's the value of $g(6)$?
c. Which is larger, $f(4)$ or $g(4)$?
d. For what values of x is $f(x) = g(x)$?
e. On what interval(s) is $f(x) < g(x)$?
f. On what interval(s) is g increasing?
g. On what interval(s) is g decreasing?
h. State the domain and range of f.
i. State the domain and range of g.

1.1 – 1.3

1.1 – Four Ways to Represent a Function
1.2 – Mathematical Models: A Catalog of Essential Functions
1.3 – New Functions from Old Functions: Shifting and Stretching Essential Functions

2. (5 pts) Three runners compete in a 100-meter race. Explain how the race went, who won, who came in 2nd, and who came in 3rd. See the graph on the right.



3. (5 pts) Evaluate the following difference quotients for $f(x) = x^2 - 3x + 2$

   a. $\dfrac{f(2+h) - f(2)}{h}$ - The book likes these.

   b. $\dfrac{f(x+h) - f(x)}{h}$ - I like these, more.

4. (5 pts) Find the domain of $\dfrac{x-3}{x^3 - 27}$.

5. (5 pts) Find the domains of the following:

   a. $f(x) = \sqrt{x^2 - 16}$

   b. $R(x) = \dfrac{1}{\sqrt{x^2 - 16}}$

6. (5 pts) Consider the piecewise-defined function $f(x) = \begin{cases} x^2 - 4x & \text{if } x < 3 \\ -2x + 3 & \text{if } x \geq 3 \end{cases}$

   a. Sketch the graph of *f*. Show all suture points and intercepts.
   b. Is *f* a continuous function?

7. (5 pts) Crickets chirp at a rate that seems related to temperature. Assume that the relationship to temperature is linear. Given that a cricket chirps 115 times per minute at 72 degrees and it chirps 180 times per minute at 81 degrees, find a linear equation that models the temperature *t* as a function of chirps per minute *N*.

8. (5 pts) Explain, step by step, how you would obtain the graph of $-3f(-2x - 14) + 11$ from the graph of $f(x)$.

9. (5 pts) Sketch the graph of $g(x) = -2\sqrt{5x - 20} + 8$ by shifting, reflecting, and stretching the graph of $f(x) = \sqrt{x}$.

10. (5 pts) Let $f(x) = x^2 - 2x - 3$ and $g(x) = 2x^2 - 3x - 5$.

    a. Find (and simplify) $h(x) = f(x) + g(x)$ and its domain.

b. Find (and simplify) $R(x)=\dfrac{f(x)}{g(x)}$ and its domain.

Grunt Pages and Hand-In Pages: A Soliloquy (Optional Read)

Back in the day, I had 2 manila folders for all my math classes. The first, and by far the thickest, was "Grunt." The second, which I kept a lot nicer, was "Hand-In." The "Grunt" was all the writing I did, to figure out the answer. "Hand-In," as the name suggests, was the version I turned in to be graded. On that version, I wrote out the question as correctly and briefly as I could, and I wrote out the steps and showed all the support, including all the scratch I used, all in one place, and as organized for someone else to read as possible.

Because I wrote so darn much on everything, and learned to explain things to someone at or slightly below my level, I basically made the perfect study guide for myself, preparing for tests. I'd flip through both folders and make sure I knew how to do everything, and could make up (or for this class, just click on "Practice Another" in any of your old WebAssign assignments) any version of it and confidently solve it, which meant that I also knew how to check my answer.

The tools are different, these days. You can check a lot of your work using technology, if you know how to use a website like Wolfram Alpha or Desmos Graphing Calculator, or you have a TI 83/84, which is kind of a standard graphing calculator. (By the way, if you do have a TI 83/84, there's a chapter in the back of the eBook that covers TI 83/84 techniques).

What I'm looking for, as an instructor, is a brief, yet complete narrative of the steps taken to solve the problem or answer the question.

You may use a pen tablet of some sort or a smartphone app, like CamScanner, to create high-quality PDFs of your written work.

Submit work as a single PDF file, of as many pages as it takes to do a good job. Don't try to save space or save paper. Learn this well, and you will go on to plant more trees than all the paper you could possibly cover with your hand-written notes.

If you use paper and pencil or pen, old-school, I would recommend a ream of cheap copier paper, 2 manila folders, a 3-ring punch, and a stapler. I stapled each section of homework together in my folders, back in the day.

If you're using a pen tablet, I think that's great. The analogue to what I used to do with manila folders can easily be replicated electronically on your device. The way I would do it would be to just save all my scribbles to Grunt in one document, and then save the latest version of Grunt to a version that lived in Hand-In. I think it's helpful to be able to see your failed attempts or rough drafts, all at a glance, when you're studying your nice, "Hand-In" version before Midterm and Final.