

Math 111 Homework 2 Hints/Solutions

In addition to the strategies from the previous worksheets, here are a couple new strategies to always try:

1. **USE SECANT AND DIAGONAL LINES:** In WS 4 and in the the Week 2 review, I pointed out the connections between secant/diagonal lines and the various quantities we have used this term. Whenever you read a question you should ask yourself “How does this relate to secant/diagonal lines?” Usually this leads to a quick solution or useful translation of the problem.
2. **REFERENCE LINES:** If you are asked to find an interval of time with a given slope, it is often useful to first draw a line the with given slope that goes through the origin. This gives a frame of reference so that when you are checking intervals you will know if the line is parallel (same slope) to the reference line or not.

Worksheet 4

PROBLEM 10: “Fill in the table.”

HOW TO SOLVE THE PROBLEM: You need to remember the definitions. That is,

$$\text{QGPA} = \frac{\text{QGP}}{\text{QCr}} \quad \text{and} \quad \text{CGPA} = \frac{\text{CGP}}{\text{Cr}}$$

Also, $\text{CGP} =$ “the sum of all the grade points so far”. Note that the $\text{QCr} = 15$ always since the student is taking 15 credits each quarter.

From this, you should be able to fill in the whole table. I would start by finding all the QGP values which you can do because you know all the QCr and QGPA values (and you have the formula above). Then find the CGP values and the CGPA values.

PROBLEM 15(d): “What is the incremental rate of flow out of the lot over the time period from 3 hours to 6 hours?”

HOW TO SOLVE THE PROBLEM: Incremental rate of flow out = the slope of a secant line to the flow out graph. Find the slope of the secant line to the flow out graph from $t = 3$ to $t = 6$ hours.

Use the “secant line method”. That is, draw the secant line from $t = 3$ to $t = 6$ on the flow out graph.

Find two ‘easy’ to read points. I approximated (11,3000) and (4,700).

Compute the slope = $\frac{3000-700}{11-4} = \frac{2300}{7} \approx 328.57$ cars/hour (which is close to the answer in the back of the book).

Worksheet 5

PROBLEM 7, 8, 9, and 10: “Translate.”

HOW TO SOLVE THE PROBLEM: Read my week 2 review. These exercises should not be difficult if you understand functional notation. If you find these difficult, then please visit the math study center. It is important that you understand how to translate before you move on.

PROBLEM 14(c): “Name the longest time interval over which the overall rate at which cars come into the lot is declining.”

HOW TO SOLVE THE PROBLEM: Overall rate into the lot = the slope of a diagonal line to the IN graph. Find the longest interval when the slope of the diagonal line is getting less steep.

Use the “diagonal line ruler trick”. Fix the ruler at the origin and begin to rotate along the IN graph.

When I did this, the ruler kept going down in slope until it got to 10 (after which it went up again). So the largest interval is from $t = 0$ to $t = 10$.