Supplement 4 HW Comments/Hints

I am provided extra hints this week to give you a little boost as you get used to this class. I also mention some important strategies about how to approach the problems. In addition to the strategies from the previous HW hints, here are a couple new strategies to always try:

1. **USE SECANT AND DIAGONAL LINES:** In class and in review sheets, I pointed out the connections between secant/diagonal lines and the various rates we have defined 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.

PROBLEM 1(b): "Assume that Juan was 64 inches tall on his 14th birthday. How tall was he 6 months later?"

Here's how to approach this problem:

1. UNDERSTAND THE GRAPH: This is a new type of graph with incremental rate information. Let's take a data point and see if we understand what it means. Note that the graph is in INCHES PER MONTH but the tick marks are for the PRECEDING THREE MONTHS. So the first tick mark is at approximately at (3, 0.275). Remember
   Average rate $= \frac{\text{Change in height}}{\text{Change in Time}}$. So the first tick mark tells us that
   $0.275 = \frac{\text{Change in height}}{3}$.
   This means that Juan grew 0.275 inches per month for the first three months for a total of $3 \cdot 0.275 = 0.825$ inches of growth in the first three months.
2. UNDERSTAND THE QUESTION: You are being asked to give his total height at 14 years and 6 months and you are given his height at 14 years. So you need to know how much his height changes over this time interval. Note that 14 years old corresponds to 24 months on the graph (since it is years since his 12th birthday).
3. USE FORMULAS AND DEFINITIONS: Using the given information, from 24 to 27 months, I approximate the height will go up 0.155 inches per month. Thus starting at 64 inches and adding 0.155 inches three times, tells me that 27 months Juan's height will be about 64.465. Use the next dot to get from 27 to 30 months and you'll be done.

PROBLEM 2(a) and (b): Quick Hints.

For part (a), use a measurement of about 275 or 280 from the graph (250 is too low, webassign won't accept it). Then divide appropriately to get your answer.
For part (b), draw a reference line! Draw a line with the desired slope and make appropriate conclusions. To draw a line with a given slope remember rise over run. If the slope is supposed to be 150, then when the graph goes over 1, then it should go up 150 (and if it goes over 2, then it should go up 300, etc...).

PROBLEM 4(e): "What is the incremental rate of flow out of the lot during the three-hour period ending at t=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 (9,2000) and (3,400).
Then compute the slope = $\frac{2000-400}{11-4}$ cars/hour.