

Homework Two

Calculus I

College of the Atlantic

Due Friday, January 17, 2025

Part 1: WeBWorK. Do Homework 02 on WeBWorK. The WeBWorK page is here: <https://webwork-hosting.runestone.academy/webwork2/coa-feldman-es3012m-winter2025>.

Part 3: A Coding Exercise. Do the following on a new google colab notebook. When you are done, please attach the notebook on google classroom. Write a notebook that does the following:

1. Use the `def` command to define the function

$$f(x) = 0.2 + \sqrt{0.25x}. \quad (1)$$

2. Write code that will evaluate the following definite integral. (Remember, “definite integral” is just a fancy name for total accumulated change.

$$\int_0^3 0.2 + \sqrt{0.25t} dt. \quad (2)$$

Hints/reminders:

- Remember to import the modules you need.
- Remember to put `np.` in front of any math functions you need from `numpy`.
- The square root function in python is `sqrt`. In other words:

$$\sqrt{613x^2} \text{ is } \text{np.sqrt}(613*x**2) \text{ in python.} \quad (3)$$

- Multiplication is indicated by a `*`. I.e., it's `10*x`, not `10x`.

Part 2: Non-WeBWorK problems. Here are some instructions for how to submit this part of the assignment.

- Do the problems by hand using pencil (or pen) and paper. There is no need to type.
- If you like working on a tablet, go for it.
- Make a pdf scan of your work using genius scan or some similar scanning app. Please make the homework into a single pdf, not multiple pdfs.
- Please, I am begging you, please don't scan your work in sideways. ☹
- Submit the assignment on google classroom. Please don't email it to me.
- If you want, you can do the non-WeBWorK and coding in pairs and submit only one assignment for the two of you.

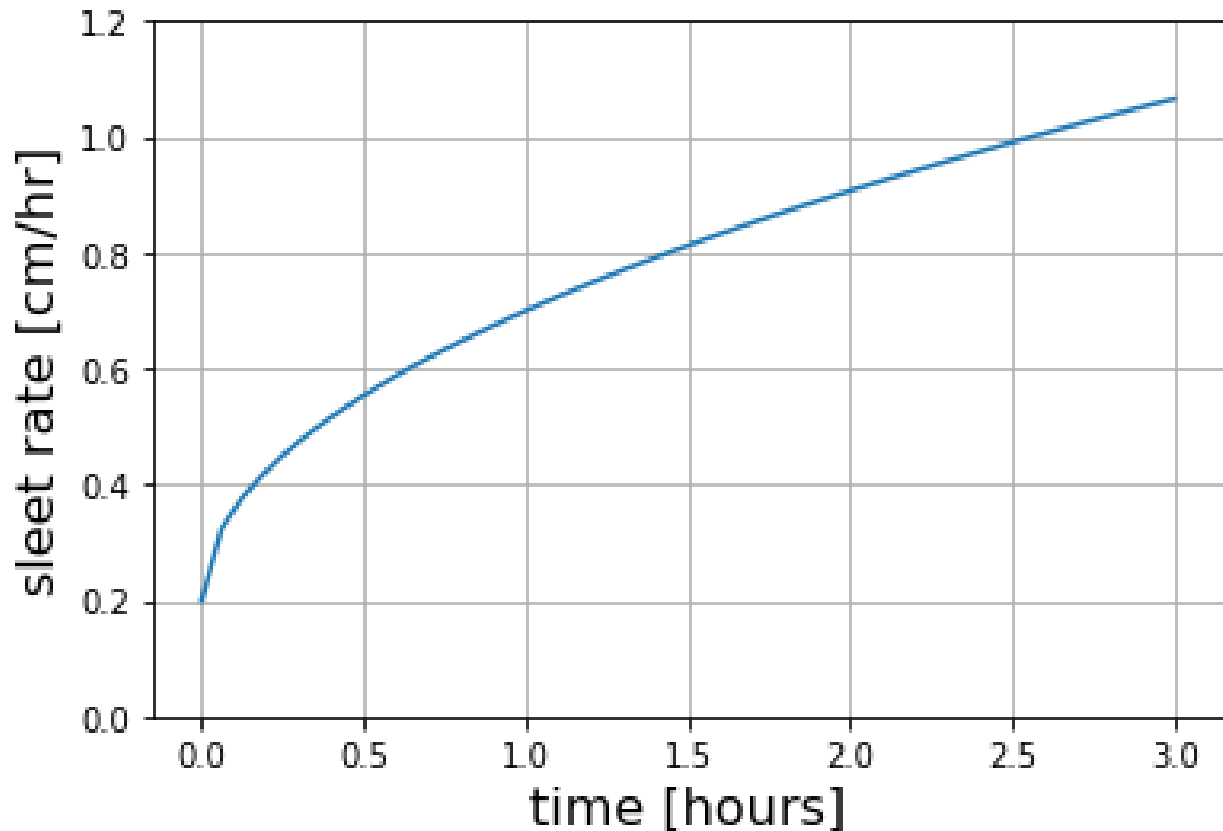


Figure 1: The rate that sleet is falling, in units of cm/hr, during the first three hours of a sleet/ice storm in Maine.

Here is a non-WeBWorK problem.

The figure below shows the rate at which sleet is falling, in units of centimeters per hour, during the first three hours of a sleet storm in Maine.

1. Come up with a lower estimate for the total amount of sleet that has fallen during the first three hours of the storm. use $\Delta t = 0.5$ hours.
2. Draw the area representing this lower estimate on the graph.
3. Come up with an upper estimate for the total amount of sleet that has fallen during the first three hours of the storm. use $\Delta t = 0.5$ hours.
4. As Δt gets smaller and smaller, the upper and lower estimates get closer and closer to each other. How small a Δt would you need to choose so that the difference between the upper and lower estimates was 0.1 cm.