

Homework Two

Calculus I

College of the Atlantic

Due Friday, January 20, 2023

There are three parts to this assignment.

Part 1: WeBWorK. Do Homework 02 on WeBWorK. The WeBWorK page is here: <https://webwork-hosting.runestone.academy/webwork2/coa-feldman-es3012m-winter2023>. I recommend doing the WeBWorK part of the homework first. This will enable you to benefit WeBWorK's instant feedback before you do part two.

Part 2: 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

$$f(x) = 10e^{-0.05x} \cos(10x/\pi) . \quad (1)$$

2. Plot the function from $x = 0$ to $x = 50$.
3. Make sure your plot looks nice and smooth.

Hints/reminders:

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

$$e^{-5t} \text{ is } \text{exp}(-5*t) \text{ in python.} \quad (2)$$

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

Part 3: 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 this assignment.
- 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.

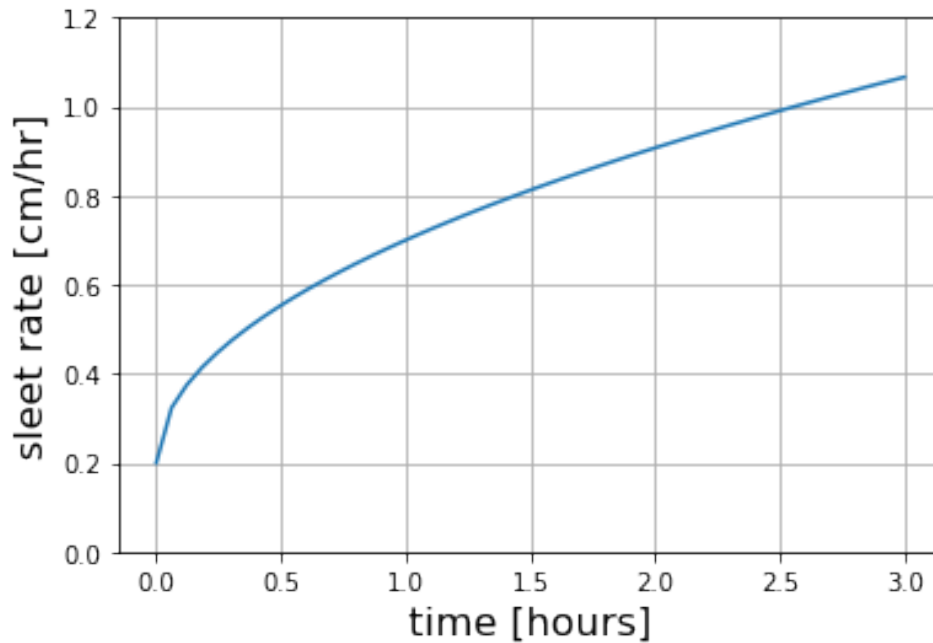


Figure 1: The rate that sleet is falling, in units of cm/hr, during the first three hours of a sleet/ice storm in Maine.

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. 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.
3. 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.