

1. Section 1.5 Problem 33
2. Newton's Law of Cooling says that the rate of change of the temperature of an object is proportional to the difference between the temperature of the object and the temperature of its environment.
 - a) Write down a differential equation that describes this situation. Be sure to describe all variables you use.
 - b) Suppose the body of a murder victim is discovered at 11:30am, and that the temperature of the body at that time is found to be 35.8°C . One hour later the body's temperature is 34.1°C . During this time, the room's temperature is 21°C . Estimate the time of death. Standard body temperature is 37°C
3. In very cold temperatures, the thickness of ice on a pond increases at a rate inversely proportional to its thickness.

The ice on a pond is initially 0.05 inches thick, and 4 hours later it is 0.075 inches thick. How thick will the ice be in 10 hours?
4. Section 1.5 Problem 38
5. Consider the initial value problem

$$\begin{aligned}y' + 3x^2y &= 1 \\ y(2) &= 1.\end{aligned}$$

- a) Write the solution of this IVP down in terms of an area-under-the-curve function.
- b) Use the quad function from Octave to numerically approximate $y(4)$. You must show both the commands you used to perform this computation as well as your numerical answer.
- c) Use Octave to graph the solution over the interval $2 \leq x \leq 4$. You may **not** use `df` to answer this question. Your answer should consist of a graph and the commands you used to generate it.