1. A carrot found in the bottom of Peacock Pond by an unnamed student last fall after the Red Sox won the World Series is found to have 95% of the carbon-14 of a living carrot. How long was the carrot in the bottom of the pond?

2. Carbon-14 can be measured in quantities as small as 0.1% of the amount present in living organisms, but once there is less than this amount, carbon-14 is essentially undetectable. What is the oldest object that can be dated using carbon-14?

3. Newton's Law of Cooling states that an object will cool at a rate proportional to the difference between its temperature and the temperature of the surrounding environment. If y indicates the temperature of the object at time t, then the DE that describes this is given by

$$y' = k(y - T_e)$$

where k is a constant and T_e is the temperature of the surrounding environment.

   a. Verify that $y = T_e + Ce^{kt}$ is a solution to the DE.

   b. A cup of coffee that is poured at exactly 8:00 has temperature 160°. If the temperature of the coffee is 150° at 8:05, what is its temperature at 8:10? Assume that the room is a comfortable 70°.

   c. When will the temperature of the coffee be 130°?