C.S.I. Maroons

A detective is called to the scene of a crime where a dead body has just been found. She arrives on the scene at 10:23 pm and begins her investigation. Immediately, the temperature of the body is taken and is found to be 80° F. The detective checks the programmable thermostat and finds that the room has been kept at a constant 70° F for the past 3 days.

$$T = C + (T_0 - C)e^{kt}$$

After evidence from the crime scene is collected, the temperature of the body is taken once more and found to be 78.5° F. This last temperature reading was taken exactly one hour after the first one. The next day the detective is asked by another investigator, **"What time did our victim die?"** Assuming that the victim's body temperature was normal (98.6° F) prior to death, what is her answer to this question? Newton's Law of Cooling can be used to determine a victim's time of death.

PART I: Find k

PART II: Find t, the time of death:

$$T = C + (T_0 - C)e^{kt}$$

$80 = 70 + (98.6 - 70) \cdot e^{kt}$

$10 = 28.6 \cdot e^{kt}$

$\frac{10}{28.6} = e^{kt}$

$\frac{\ln\left(\frac{10}{28.6}\right)}{-0.0027} = \frac{-0.0027t}{-0.0027}$

$t = 389$ min.

10:23 PM

− 6 hrs.

4:23 PM

−29 min

T.O.D. 3:54 PM

HW 2.3 - Day 2 Answers continued

3.)a.) k = -0.0419

b.) t = 69.6 minutes

4.)a.) k = -0.1643

b.) t = 11.5 minutes

5.)a.) k = -0.0024

b.) T.O.D. = 7:26 AM