

Math 1910, Section 9, Fall 2011: Extra Credit Quiz #5

Name _____

The level of interest in Professor Wigger's lectures is a function of time, $I(t)$, which wanes at a rate which is proportional to the current level of interest. Students begin each class period with a full level of interest ($I(0)=1.0$) but interest levels fall to about 50% after 35 minutes ($I(35)=0.5$).

(a) Find an algebraic expression for $I(t)$, using the value of $I(35)$ to determine the value of the rate at which interest declines.

$$I(t) = I(0)e^{kt} = (1.0)e^{kt} = e^{kt}$$

$$I(35) = 0.5 = e^{35k}$$

$$\ln(0.5) = 35k$$

$$k = \ln(0.5)/35$$

$$I(t) = e^{\ln(0.5)t/35} = (0.5)^{t/35} = (2)^{-t/35}$$

(b) What is the level of interest at the end of the class period, when $t=55$? It's OK to leave your answer in terms of logs.

$$I(55) = e^{\ln(0.5)55/35} = (0.5)^{55/35} = (2)^{-55/35} = 0.336475 \text{ percent of full interest level}$$