Quiz #36   Name: _____Key_____

You must show your work to get full credit.

Let S be the mass in grams of a colony of bacteria and t the time in hours since the the colony was formed. Assume that the colony grows at a rate proportion to its size.

(1) Write a differential equation for S.

1 pt

Equation is: $\dfrac{dS}{dt} = k S$

where k is a constant of proportionality

(2) Write the general solution to this equation.

1 pt

$S(t) =$ _____$S(0) e^{kt}$_____ grams

(3) If $S = .001$ when $t = 0$ and $S = .005$ when $t = 2$ find $S(t)$.

2 pts Then $S(0) = .001$. So

$S(t) = .001 e^{kt}$

$S(2) = .001 e^{2k} = .005$

$e^{2k} = 5$

$S(t) =$ _____$.001 e^{.8047 t}$_____

$2k = \ln(5)$

$k = \dfrac{\ln(5)}{2} =$

(4) What is S when $t = 24$? $S(24) =$ _____$244,140.62$ grams_____

1 pt

$S(24) = .001 e^{(.8047)(24)}$

$= 244,140.62$