continuous rate constant.

8% / year

$0.08t$

$y = Ae^{0.08t}$

$y = 300e^{0.08 \cdot 5}$

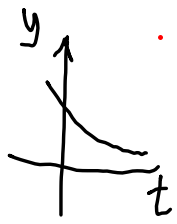
$y = 300e^{.40}$

Question 4

$y = Ae^{kt}$

$y = A\left(\frac{1}{2}\right)^{t/T}$

t (h)	y
0	100 %
3	50 %
4	40 %
6	25 %
7	20%
9	12.5 %
10	10 %
12	6.25 %
13	5 %



0 100 %
3 50
6 25
9 12.5
12 6.25
15 3.125 %.

(0, 100) $y = 100e^{kt}$ $y = 100(1/2)^{t/T}$

(4, 40)

Method 1 $k \cdot 4$

$40 = 100e$

Solve for k.

$0.4 = e^{4 \cdot k}$

$\ln(0.4) = 4k$

$k = 4/\ln(0.4) = -0.22907/\text{hour}.$

Have formula

$y = 100e^{-0.22907t}$

$k \cdot t$

a) $50 = 100e$

Solve for t. ↑

$\ln(0.5) = -0.22907 \cdot t$

$t = \frac{-0.693}{-0.22907} = 3.0 \text{ hours}.$

b, y (when $t = 7$ hours) = ✓

$y = 100e^{-0.22907 \cdot t} = 100e^{-0.22907 \cdot 7} = 20.1\%$

Method 2

$y = 100\left(\frac{1}{2}\right)^{t/T}$

$40 = 100\left(\frac{1}{2}\right)^{4/T}$

$T_{1/2}$

T_2

$LN(0.4) = LN\left(\frac{1}{2}\right)^{\frac{4}{T}}$

$LN(0.4) = \frac{4}{T} LN(0.5)$

$T = \frac{4 LN(0.5)}{LN(0.4)} = 3.0$

$\log(u^n) = n \log(u)$

b) $y = 100\left(\frac{1}{2}\right)^{7/3} = 19.8 \approx 20$

t	y
0	100
3	30
4	40
7	

Examples (7-14) $Ae^{kt} = y$

8. \$20,000 10.5%/year. $= k$

DOUBLING TIME ↖ continuous rate constant.

$y(10 \text{ years})$ $0.105 \cdot t$

$y = 20000\, e^{0.105t}$

$40000 = 20000\, e^{0.105t}$

$2 = e^{0.105t}$

$\ln(2) = 0.105 \cdot t$

$t = 0.693 / 0.105 = 6.6 \text{ yrs.}$

$y(10) = 20000\, e^{0.105 \cdot 10} = 57,153.02$

Use Questions 25 & 26 as examples

25. $y = 10\left(\frac{1}{2}\right)^{1000/1620}$

26. $1.5 = A\left(\frac{1}{2}\right)^{1000/1620}$

$$A = \frac{1.5}{\left(\frac{1}{2}\right)^{1000/1620}}$$

$= 2.30\,g$