

$$e^x \text{ -vs- } \left(\frac{1}{2}\right)^x$$

$\frac{1}{2}$ -life of Millium is 50 years

$$A_0 e^{kx}$$

$$A_0 \left(\frac{1}{2}\right)^{kx}$$

$$A_0 e^{50k} = \frac{1}{2} A_0$$

$$A_0 \left(\frac{1}{2}\right)^{50k} = \frac{1}{2} A_0$$

$$e^{50k} = \frac{1}{2}$$

$$\left(\frac{1}{2}\right)^{50k} = \frac{1}{2} = \left(\frac{1}{2}\right)^1$$

$$\ln(e^{50k}) = \ln\left(\frac{1}{2}\right) = -\ln(2)$$

$$50k = 1$$

$$50k = -\ln(2)$$

$$k = \frac{1}{50}$$

$$k = \frac{-\ln(2)}{50} \approx -0.01386294361$$

$$A_0 \left(\frac{1}{2}\right)^{kx} = A_0 \left(\frac{1}{2}\right)^{\frac{1}{50}x}$$

$$A_0 e^{kt} = A_0 e^{-\frac{\ln(2)}{50}x} \approx A_0 e^{-0.01386294361x}$$

-0.1386294361e-1

$$e^{-\frac{\ln(2)}{50}x} = e^{\ln(2)\left(-\frac{1}{50}x\right)} = \left(e^{\ln(2)}\right)^{-\frac{1}{50}x} = 2^{-\frac{1}{50}x}$$

$$= \frac{1}{2^{\frac{1}{50}x}} = \frac{1}{2^{\frac{1}{50}x}} = \left(\frac{1}{2}\right)^{\frac{1}{50}x}$$

Same!

$l = 1$  Any power

CHEAT for  $\frac{1}{2}$ -life question:

$$A_0 \left(\frac{1}{2}\right)^{kt} = A_0 \left(\frac{1}{2}\right)^{\frac{1}{\text{half-life}}t}$$

Doubling time  $2^{kx}$

Exponential Model  
key phrase:

Quadrupling time  $3^{kx}$

"uninhibited growth"

CHEAT for  $\frac{1}{2}$ -life question:

$$A_0 \left(\frac{1}{2}\right)^{kt} = A_0 \left(\frac{1}{2}\right)^{\frac{t}{\text{half-life}}}$$

When's our Final Test?

**Wednesday, December  
5th. One more meeting  
on Friday, after.**

$\log_3(x) = f(x)$

$x=0$

(2) (M1)

$7f(x+16)$

$x \mapsto x-16$

$x = -16$

$\frac{1}{3} - 16 = \frac{1-48}{3} = -\frac{47}{3}$

$1 - 16 = -15$

$3 - 16 = -13$

$g(x) = 7 \log_3(8x+16) - 5$

$x=0$

$y \mapsto 7y$

(M2)

$7f(8x)$

$x \mapsto \frac{1}{8}x$

(3)  $7f(8x+16) = 7f(8(x+2)) = 7 \log_3(8x+16) = 7 \log_3(8(x+2))$

$M1$ 
 $M2$

$x \mapsto \frac{1}{8}x$ 
 $\text{Left } 2$

$x \mapsto x-2$

$x \mapsto \frac{1}{8}x$

$x = -2$

From M2:

$\frac{3}{8} - 2 = \frac{3-16}{8} = -\frac{13}{8}$

$\frac{1}{24} - 2 = \frac{1-48}{24} = -\frac{47}{24}$

From M1:

$-\frac{47}{3} \cdot \frac{1}{8}$

$-\frac{15}{8}$        $-\frac{16}{8} = -2$

$-\frac{13}{8}$