25 $\ln[(25)(1.05)^x] = 6$

$\ln(25) + \ln(1.05)^x = 6$

$\ln(1.05)^x = 6 - \ln(25)$

$x \ln(1.05) = 6 - \ln(25)$

$x = \dfrac{[6 - \ln(25)]}{\ln(1.05)} \approx 57.007$

24 $\log(5x^3) = 2 \iff 10^2 = 5x^3$

$10^{\log(5x^3)} = 10^2$

$5x^3 = 10^2$

$x^3 = 20$

$x = \sqrt[3]{20} = 20^{\wedge}(1/3)$

$\log(5x^3) \neq 3\log(5x)$

$\log(5x^3) \rightarrow \log 5 + \log x^3$

$= \log 5 + 3\log x$

$$\ln\left(\frac{25\sqrt{x}}{3}\right) = 2$$ solve for x.

$$\ln(25\sqrt{x}) - \ln(3) = 2$$

$$\ln 25 + \ln\sqrt{x} - \ln(3) = 2$$

$$\ln 25 + \tfrac{1}{2}\ln x - \ln 3 = 2$$

$$\tfrac{1}{2}\ln x = 2 - \ln 25 + \ln 3$$

$$\ln x = 4 - 2\ln 25 + 2\ln 3$$

$\log_b x = y$ $\Leftrightarrow$ $b^y = x$

$$x = e^{\ln x} = e^{(4 - 2\ln 25 - 2\ln 3)}$$

$$\ln\left(\frac{25\sqrt{x}}{3}\right) = 2$$

$$e^{\ln\left(\frac{25\sqrt{x}}{3}\right)} = e^2$$

$$\frac{25\sqrt{x}}{3} = e^2$$

$$\sqrt{x} = \frac{3}{25}e^2$$

$$x = \frac{9}{625}e^4$$

Applications of exponentials

Population Growth

100 rabbits. 15% growth per year.

$$\boxed{P(t) = 100(1.15)^t}$$

$P(10) = 100(1.13)^{10}$

Q: when will I have 1000 bunnies?

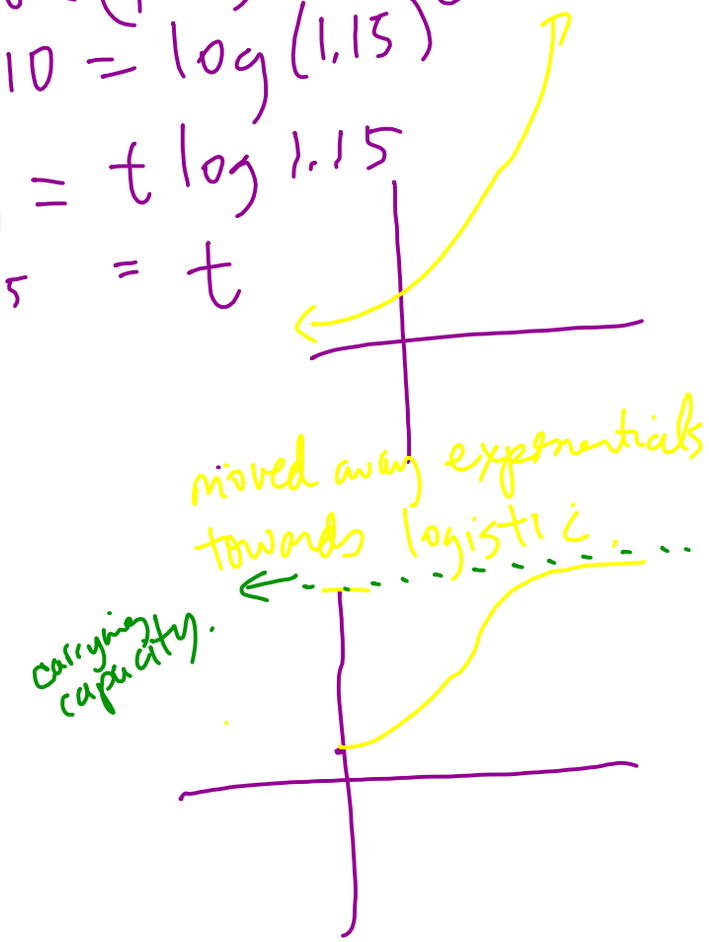
$$1000 = 100(1.15)^t$$

$$10 = (1.15)^t$$

$$\log 10 = \log (1.15)^t$$

$$1 = t \log 1.15$$

$$16.48 = \frac{1}{\log 1.15} = t$$



Radioactive Decay

geiger counter

half-life:

time it takes for half of the original material to decay. "λ"

$^{238}_{94}Pu$

$\lambda = 87.7$ yrs.

$$\left.\begin{aligned} \log_b x &= y \\ y &= b^x \end{aligned}\right\} \text{inverses}$$

$$\log_b \square = \bigcirc$$

$$\log_b (b^{\bigcirc}) = \bigcirc$$

$$\log_b b = 1$$