Applications of Logarithms

Great grandpa Sedley left a box buried in your backyard containing $25,000. If you invest it at 4% compounded monthly, will you be a millionaire in your lifetime?

$$A = P\left(1 + \frac{r}{n}\right)^{nt}$$

$$\frac{1{,}000{,}000}{25{,}000} = \frac{25{,}000\left(1 + \frac{0.04}{12}\right)^{12t}}{25{,}000}$$

$$\log 40 = \log 1.0033^{12t}$$

$$\frac{\log 40}{12 \cdot \log(1.033)} = \frac{12 \cdot t \cdot \log(1.0033)}{12 \cdot \log(1.0033)}$$

$$93.3 \text{ yrs} = t$$

1) Divide initial amt to opposite side
2) log or plog

CAR - $19,500 15% depreciation
Trade it in when value of $10,000.
How many years will you drive the car?

$$N = N_0 (1 \pm r)^t$$

$$\frac{10{,}000}{19{,}500} = \frac{19{,}500(1-0.15)^t}{19{,}500}$$

$$\log \frac{20}{39} = \log 0.85^t$$

$$\frac{\log\left(\frac{20}{39}\right)}{\log(0.85)} = \frac{t \cdot \log(0.85)}{\log(0.85)}$$

$$4.1 \text{ yrs} = t$$

Carbon-14, a radioactive isotope, is used to find the age of fossils. A piece of parchment from an ancient scroll is found to have 62.5% of its Carbon-14 left. How old is the scroll? The constant of decay of Carbon-14 is -0.000121. (k)

$$q = q_0 e^{kt}$$

$$q = q_0 e^{-0.000121t}$$

$$\frac{0.625}{1} = \frac{1}{1} e$$

$$\ln 0.625 = \ln e^{-0.000121t}$$

$$\frac{\ln(0.625)}{-0.000121} = \frac{-0.000121t}{-0.000121}$$

$$3884 \text{ yrs} = t$$

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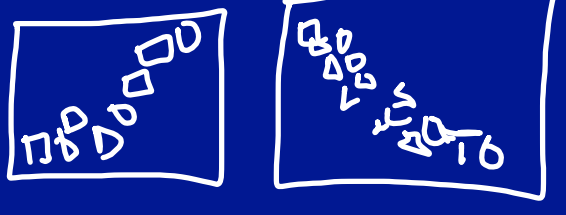
Exponential Regression

$y = a \cdot b^x$

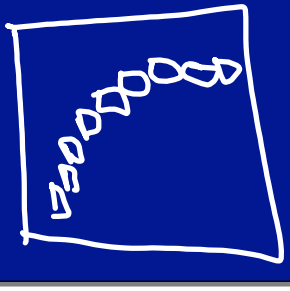


Power Regression

$y = a x^b$ ← any power

Logarithmic Regression

$y = a \ln b$



Logarithmic

~~Logistic~~

1) r^2
2) balanced pts on each side
3) Predict the future accurately

Tree Height

age	height
25	
	30

← Know x = Table

← Know y = Graph & Intersect