

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?

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

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

$$\frac{1,000,000}{25,000} = \frac{25,000}{25,000} \cdot \left(1.0033\right)^{12t}$$

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

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

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

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

- 1) Divide initial amt to opposite side
- 2) Add logs to both sides
- 3) Plug exponent to front
- 4) Solve

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

$$N = N_0 (1 - r)^t$$

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

$$\frac{20}{39} = (0.85)^t$$

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

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

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 .

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

$$\frac{0.625}{1} = \frac{e^{-0.000121t}}{1}$$

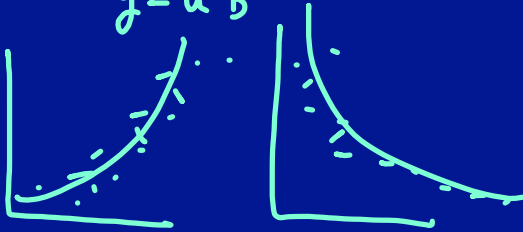
$$\ln(0.625) = \ln(e^{-0.000121t})$$

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

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

Exponential Regression

$$y = a \cdot b^x$$

Power Regression

$$y = a x^b$$

$$x^2, x^3, x^{1/2}, x^{2/3}$$

1) Balanced pts.
on each side
of curve

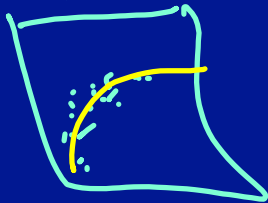
2) r^2

3) How does it
predict future?

Logarithmic Regression

$$y = a \ln b$$

LnRegr Not logistic



Know x-coord

30

Go to Table Ctrl-T

Know y-coord

When 25 ft tall

f_1 + press enter

(Turn on eq.)

$f_2 = 25$

Zoom out + intersect.