Many formulas include exp. + logs — investments, loans
Many everyday occurrences involve exp + logs — weather, earthquakes, growth/decay

here are a few

future value → $FV = \dfrac{R\left[(1+i)^n - 1\right]}{i}$

R = regular $ investment
i = interest rate % per compounding period
n = # of investments

present value → $PV = \dfrac{R\left[1 - (1+i)^{-n}\right]}{i}$

magnitude of an earth quake (Richter Scale – after Charles Richter)

$$M = \log\left(\frac{I}{S}\right)$$

M = magnitude
I = intensity of vibrations
S = intensity of a standard earthquake

ex. 1 Chile had an earthquake of magnitude 9.5 in 1960. Calculate the intensity in terms of a standard earthquake.

$$M = \log\left(\frac{I}{S}\right)$$

$$M = \log\left(\frac{I}{S}\right)$$

$$9.5 = \log\left(\frac{I}{S}\right)$$

$$10^{9.5} = \frac{I}{S}$$

$$10^{9.5} S = I$$

3 billion S

It was $10^{9.5}$ times as intense.

ex.2 A person borrows \$15000 for a car. They can pay \$300 a month. The loan will be repaid with equal monthly payments at 6% annual interest, compounded monthly. How many monthly payments will they make?

$$PV = \frac{R\left[1-(1+i)^{-n}\right]}{i}$$

PV = \$15,000

$i = \frac{6\%}{12} = 0.005$ comp monthly

R = \$300

n = ?

$$15000 = \frac{300\left[1-(1+0.005)^{-n}\right]}{0.005} \quad \times 0.005$$

$$75 = 300\left[1-(1.005)^{-n}\right]$$

÷300 300

$$0.25 = 1 - (1.005)^{-n}$$

$-1 \quad -1$

$$-0.75 = -(1.005)^{-n}$$

$-1 \quad -1$

$$0.75 = 1.005^{-n}$$

$$\log 0.75 = \log 1.005^{-n}$$

$$\frac{\log 0.75}{\log 1.005} = \frac{-n \log 1.005}{\log 1.005}$$

$$-57.68\ldots = -n$$

$$57.68\ldots = n$$

$n \doteq 58$ months

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