51 46% had decayed

$\lambda = 5728$

$A(t) = A_0\left(\frac{1}{2}\right)^{t/5728}$

$0.54 = 1\left(\frac{1}{2}\right)^{t/5728}$

$\log 0.54 = \frac{t}{5728}\log\left(\frac{1}{2}\right)$

$\frac{5728\log 0.54}{\log\left(\frac{1}{2}\right)} = t$

$5092 \approx t$

$A(t) = A_0 e^{kt}$

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

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

$\ln\left(\frac{1}{2}\right) = k\lambda$

$\frac{\ln(2^{-1})}{\lambda} = \frac{\ln\left(\frac{1}{2}\right)}{\lambda} = K$

$K = \frac{-\ln 2}{5728}$

half life k

$A(t) = A_0 e^{\frac{-\ln 2}{5728}t}$

$0.54 = 1e^{-\frac{\ln 2}{5728}t}$

$\ln(0.54) = \ln\left(e^{-\frac{\ln 2}{5728}t}\right)$

$\ln(0.54) = -\frac{\ln 2}{5728}t$

$-5728\frac{\ln(0.54)}{\ln(2)} = t$

47

$A(t) = A_0 e^{kt}$

4% continuous growth.

$A(t) = A_0 e^{0.04t}$

$3 = 1 e^{0.04t}$

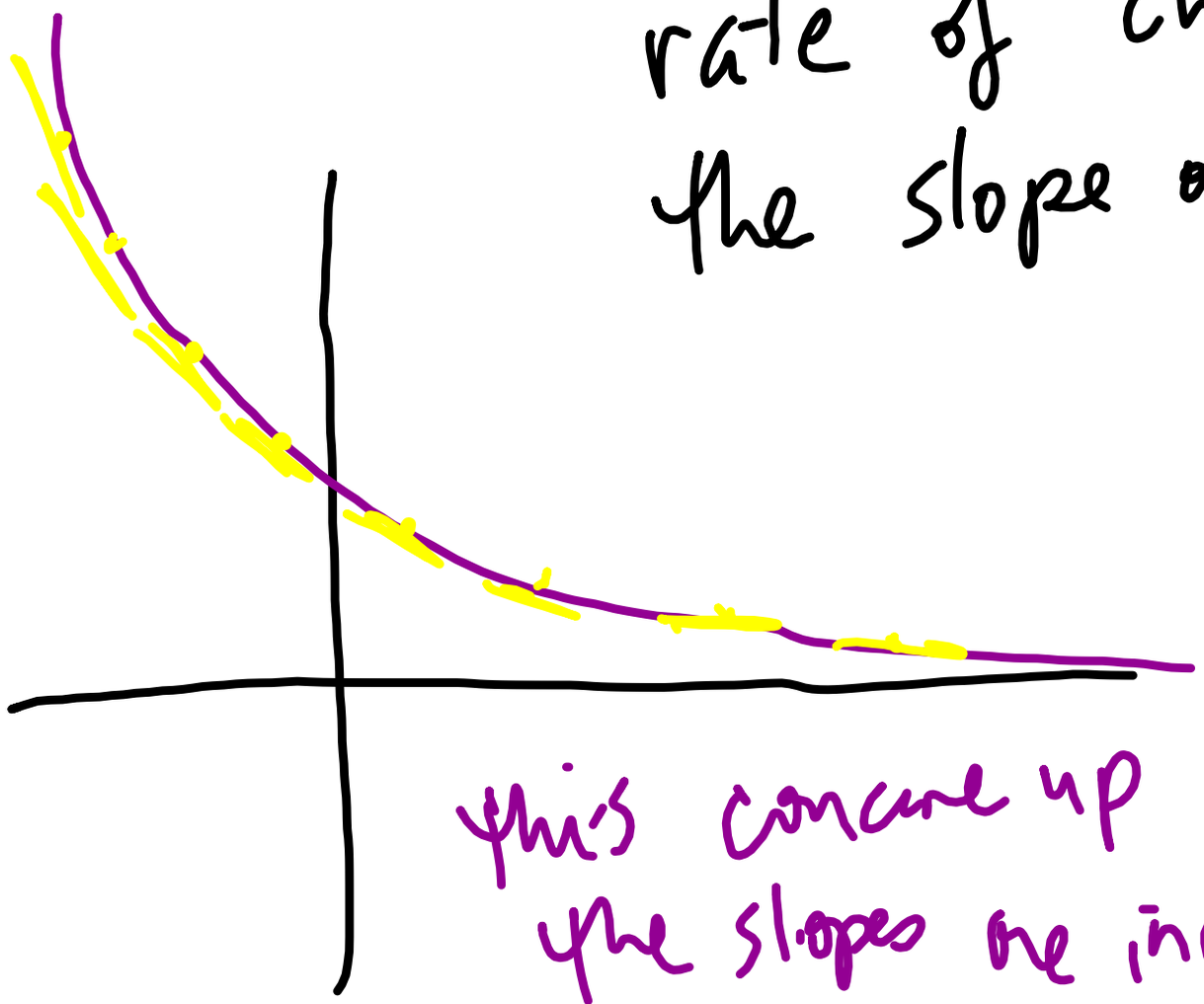
$\ln 3 = \ln(e^{0.04t})$

$\ln 3 = 0.04t$

$\frac{\ln 3}{0.04} = t$

49 c

Concavity is the rate of change of the slope of a function.



these yellow segments are called tangent lines to the curve.

this concave up
the slopes are increasing

Inverses

$f(x) = e^x$ and $g(x) = \ln x$ are inverses

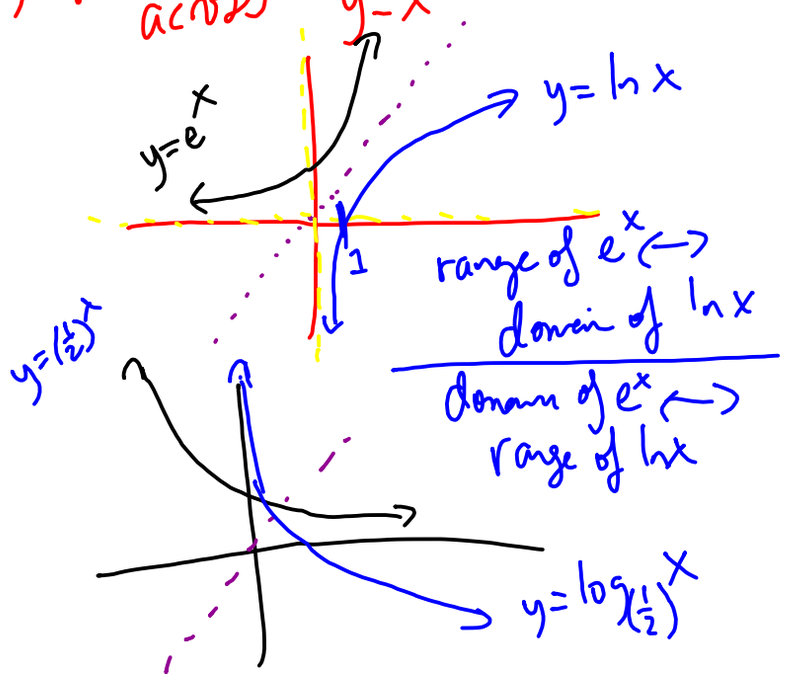
and $f(x) = b^x$ and $g(x) = \log_b x$ are inverses.

and $f(x) = ab^x \iff x = ab^y$

$\frac{x}{a} = b^y$

$\log_b\left(\frac{x}{a}\right) = y$

Since f and its inverse are related by swapping x and y, graphically that is a reflection across $y = x$



range of e^x $\longleftrightarrow$ domain of $\ln x$

domain of e^x $\longleftrightarrow$ range of $\ln x$