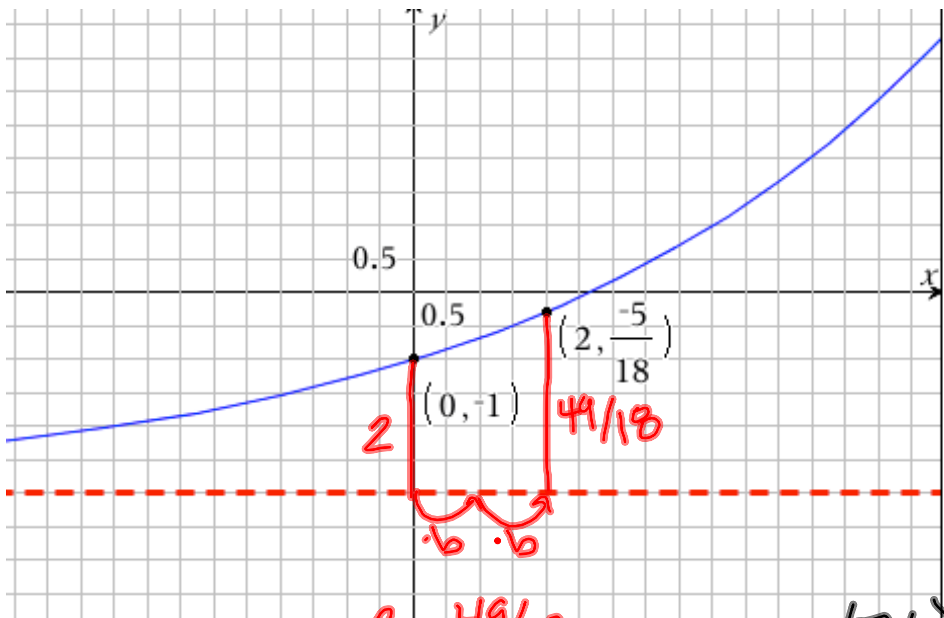
Write an equation for this exponential equation.



$$\frac{2\cdot b^2}{2} = \frac{49/18}{2}$$

$$\sqrt{b^2} = \sqrt{49/36}$$

$$b = 7/6$$

$$y = 2(7/6)^x - 3$$

$$y = \frac{49}{18}(7/6)^{x-2} - 3$$

Simplify (NC)

a. $\ln e^{\log_7 49^4}$

7^2

$\ln e^{\log_7 7^8}$

$\ln e^8$

$\boxed{8}$

b. $\log_{25} 125$

$25^{3/2}$

$\log_{25} 25^{3/2}$

$\log_{25} 5 + \log_{25} 25$

$1/2 + 1$

$3/2$

c. $\log_9\left(\ln\left(\log_{10} 10^{e^{27}}\right)\right)$

$\log_9\left(\ln e^{27}\right)$

$\log_9 27$

$\boxed{3/2}$

Solve. (WC)

$e^{4x} \cdot e^{-12} = 18$

$e^{4x-12} = 18$

$\ln e^{4x-12} = \ln 18$

$4x-12 = \ln 18$

a. $\cancel{2} \cdot \frac{1}{\cancel{2}} e^{4x} \cdot \frac{1}{e^{12}} = 9 \cdot 2$

$x = 3.723$

b. $\frac{400}{1+e^{-x}} = 350$

1.946

w-sub.

c. $(\log_3 x)^2 - \log_3 x^6 = 27 \longrightarrow w^2 - 6w = 27$

$x = \frac{1}{27}$ $x = 3^9$

(WC)

The half-life of Claytonium is 4 years. Determine the equation of decay for Claytonium.

$y = a(1/2)^{t/4}$

$\frac{1}{2} = 1 e^{k(4)}$ ($y = ae^{k(4)}$)

$1/2 = e^{4k}$

$\ln(1/2) = \ln e^{4k}$

$\frac{\ln(1/2)}{4} = \frac{4k}{4}$

$k = -.173287$

$y = ae^{-.173287t}$

A teacher examining a potential graduate estimates that the student contains only about 15% as much Claytonium as he would have contained when he entered Clayton. How long ago did the student enter Clayton?

$.15 = 1(1/2)^{t/4}$

$\log_{1/2}(.15) = \log_{1/2}(1/2)^{t/4}$

$\log_{1/2}(.15) = t/4$

$4 \cdot \log_{1/2}(.15) = t$

$10.948 = t$

yrs

$.15 = e^{-.173287t}$

$\ln(.15) = \ln e^{-.173287t}$

$\frac{\ln(.15)}{-.173287} = \frac{-.173287t}{-.173287}$

$10.948 = t$

Determine the amount of money that should be invested at 2.4% interest, compounded continuously to produce a final balance of $30,000 in 15 years. (WC)

$$30{,}000 = Ae^{.024(15)}$$

$$\frac{30000}{1.4333} = \frac{A(1.43333)}{1.4333}$$

$$20930.290 = A$$

(NC)
For how many integers between 1 and 20 can the natural logarithms be approximated given that $\ln 2 \approx 0.6931$?
$\ln 3 \approx 1.0986$
$\ln 5 \approx 1.6094$

$\ln 4 = \ln 2 + \ln 2$

$\ln 6 = \ln 2 + \ln 3$

$\cancel{\ln 7}$

$\ln 8 = \ln 2 + \ln 2 + \ln 2$

$\ln 9 = \ln 3 + \ln 3$

$\ln 10 = \ln 2 + \ln 5$

$\cancel{\ln 11}$

$\ln 12 = \ln 4 + \ln 3$

$\cancel{\ln 13}$

$\cancel{\ln 14}$

$\ln 15 = \ln 3 + \ln 5$

$\ln 16 = 4(\ln 2)$

$\cancel{\ln 17}$

$\ln 18 = \ln 9 + \ln 2$

$\cancel{\ln 19}$

$\ln 20 = \ln 2 + \ln 10$

13

(WC)
The population of Las Vegas in 1990 was 258,000 and 478,000 in 2000. Find the exponential growth model,

$$y = ae^{kt}$$

for the population of Las Vegas.

$y = 258{,}000e^{kt}$

$\frac{478000}{258000} = \frac{258000e^{k(10)}}{258000}$

$\ln\left(\frac{478000}{258000}\right) = \ln e^{10k}$

$\frac{\ln\left(\frac{478000}{258000}\right)}{10} = \frac{10k}{10}$

$.0616651 = k$

$y = 258000e^{.0616651t}$

t = yrs since 1990

Predict the population in 2010.

$y = 258000e^{.0616651(20)}$

$y = 885597.638$

December 12, 2016