

Determine whether each equation represents exponential growth or exponential decay.

$$y = 0.87 \cdot 12.5^x$$

$$y = \left(\frac{3}{5}\right)^x$$

Write an exponential function to model each situation. Find the value after 5 years.

The population of Olintown (305 people) is increasing at an annual rate of 12%.

A \$16000 car depreciates 11% each year.

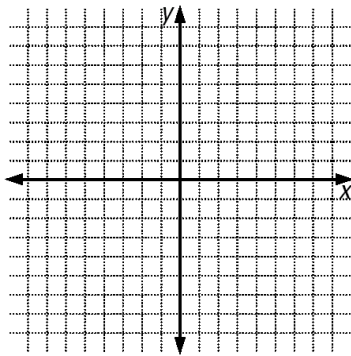
Radium has a half-life of 1620 years. Write the decay function for a 30 mg sample. Find the amount of radium remaining after 140 years.

Write an exponential equation $y = ab^x$ whose graph passes through the given points.

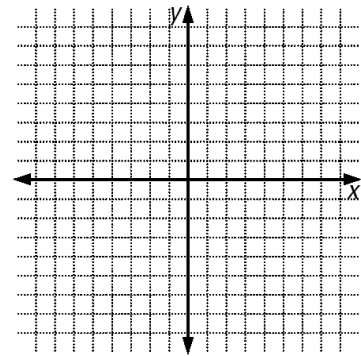
(1, 10) and (3, 40)

Graph each exponential function. Label two points and the asymptote.

$$y = 5^x$$



$$y = 5^x - 3$$



Use the continuously compounded interest formula $A = Pe^{rt}$ to find the amount using the given conditions.

principal: \$4000

annual interest rate: 3.6%

time: 4 years

Write each equation in logarithmic form.

$$6^3 = 216$$

$$10^{-5} = 0.00001$$

$$e^0 = 1$$

Write each equation in exponential form.

$$\log_3 81 = 4$$

$$\log 0.01 = -2$$

$$\ln e = 1$$

Use your calculator to evaluate each of the following. Round to four decimal places.

$$e^4$$

$$\log 125$$

$$\log 0.000314$$

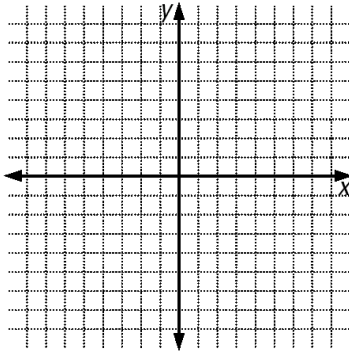
$$\ln 3.6$$

$$e^{-\frac{1}{2}}$$

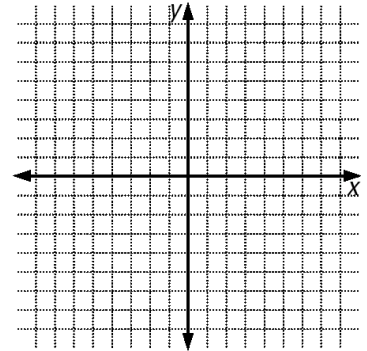
$$\ln(5.1 \times 10^3)$$

Graph each logarithmic function. Label two points and the asymptote.

$$y = \log_3 x$$



$$y = \log_3(x + 2)$$



Write each logarithmic expression as a single logarithm.

$$\log_7 12 + \log_7 x$$

$$\log 15 - 2 \log 3$$

$$\frac{1}{2}(\log_4 x + \log_4 y) - 3 \log_4 z$$

$$3 \ln x + 5 \ln y$$

Expand each logarithm.

$$\log_4 x^2 y^3$$

$$\log\left(\frac{15}{x}\right)$$

Evaluate each using the Change of Base Formula.

$$\log_{12} 53$$

$$\log_{\frac{1}{3}} 50$$

Solve each equation. Round your answers to the nearest hundredth if necessary.

$$4^x = 27$$

$$5 + 7^{x-3} = 30$$

$$\log(2x + 5) = 1$$

$$2 \log_3 x = 8$$

$$e^{3x} = 12$$

$$2 \ln 4 + \ln x = 6$$

Determine whether each equation represents exponential growth or exponential decay.

$y = 0.87 \cdot 12.5^x$ GROWTH

$y = \left(\frac{3}{5}\right)^x$ DECAY

Write an exponential function to model each situation. Find the value after 5 years.

The population of Olintown (305 people) is increasing at an annual rate of 12%.

$y = 305 \cdot 1.12^x$, about 538 people

A \$16000 car depreciates 11% each year.

$y = 16000(0.89)^x$, about \$8934.50

Radium has a half-life of 1620 years. Write the decay function for a 30 mg sample. Find the amount of radium remaining after 140 years.

$y = 30 \left(\frac{1}{2}\right)^{\frac{x}{1620}}$, about 28.26 mg

Write an exponential equation $y = ab^x$ whose graph passes through the given points.

(1, 10) and (3, 40)

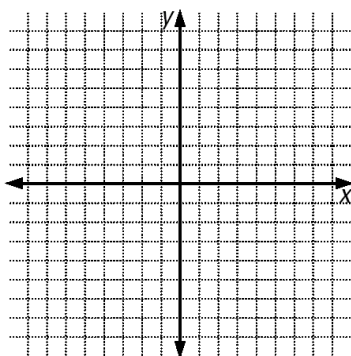
$y = 5(2)^x$

Graph each exponential function. Label two points and the asymptote.

$y = 5^x$

(0, 1)
(1, 5)

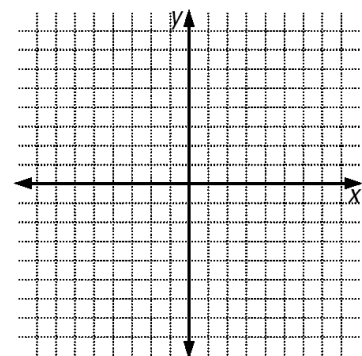
asymptote
 $y = 0$



$y = 5^x - 3$

(0, -2)
(1, 2)

asymptote
 $y = -3$



Use the continuously compounded interest formula $A = Pe^{rt}$ to find the amount using the given conditions.

principal: \$4000

annual interest rate: 3.6%

time: 4 years

$A \approx \$4619.54$

Write each equation in logarithmic form.

$6^3 = 216$

$\log_6 216 = 3$

$10^{-5} = 0.00001$

$\log(0.00001) = -5$

$e^0 = 1$

$\ln 1 = 0$

Write each equation in exponential form.

$\log_3 81 = 4$

$3^4 = 81$

$\log 0.01 = -2$

$10^{-2} = 0.01$

$\ln e = 1$

$e^1 = e$

Use your calculator to evaluate each of the following. Round to four decimal places.

$$e^4 \approx 54.5982$$

$$\log 125 \approx 2.0969$$

$$\log 0.000314 \approx -3.5031$$

$$\ln 3.6 \approx 1.2809$$

$$e^{-\frac{1}{2}} \approx 0.6065$$

$$\ln(5.1 \times 10^3) \approx 8.5370$$

Graph each logarithmic function. Label two points and the asymptote.

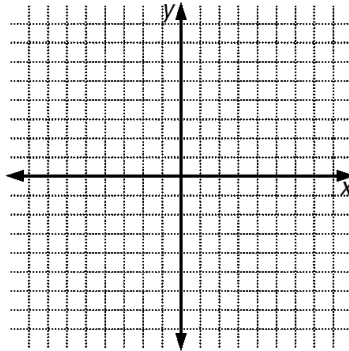
$$y = \log_3 x$$

$$(1,0)$$

$$(3,1)$$

asymptote

$$x = 0$$



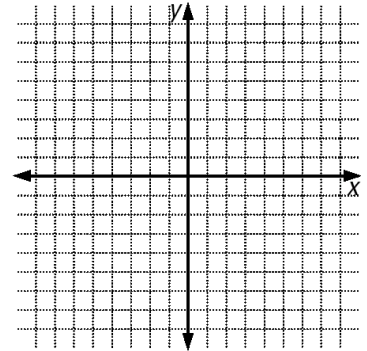
$$y = \log_3(x + 2)$$

$$(-1,0)$$

$$(1,1)$$

asymptote

$$x = -2$$



Write each logarithmic expression as a single logarithm.

$$\log_7 12 + \log_7 x$$

$$\log_7 12x$$

$$\log 15 - 2 \log 3$$

$$\log\left(\frac{5}{3}\right)$$

$$\frac{1}{2}(\log_4 x + \log_4 y) - 3 \log_4 z$$

$$\log_4 \frac{\sqrt{xy}}{z^3}$$

$$3 \ln x + 5 \ln y$$

$$\ln x^3 y^5$$

Expand each logarithm.

$$\log_4 x^2 y^3$$

$$2 \log_4 x + 3 \log_4 y$$

$$\log\left(\frac{15}{x}\right)$$

$$\log 15 - \log x$$

Evaluate each using the Change of Base Formula.

$$\log_{12} 53 \approx 1.60$$

$$\log_{\frac{1}{3}} 50 \approx -3.56$$

Solve each equation. Round your answers to the nearest hundredth if necessary.

$$4^x = 27$$

$$x \approx 2.38$$

$$5 + 7^{x-3} = 30$$

$$x \approx 4.65$$

$$\log(2x + 5) = 1$$

$$x = 2.5$$

$$2 \log_3 x = 8$$

$$x = 81$$

$$e^{3x} = 12$$

$$x \approx 0.83$$

$$2 \ln 4 + \ln x = 6$$

$$x \approx 25.21$$