$6^{2n-1} = 216$

$6^{2n-1} = 6^3$

$2n-1 = 3$

$+1 \quad +1$

$\frac{2n}{2} = \frac{4}{2}$

$n = 2$

$9^{-2v} = 27^{-3v}$

$3^{2(-2v)} = 3^{3(-3v)}$

$3^{-4v} = 3^{-9v}$

$-4v = -9v$

$+9v \quad +9v$

$5v = 0$

$v = 0$

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$7^n = 26$

$n = \log_7 26$

$11^x = 2$

$x = \log_{11} 2$

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Solve each equation. Round your answers to the nearest ten-thousandth.

$\log_6 6^{v+8} = \log_6 68$

$v+8 = \log_6 68$

$-8 \quad -8$

$v = \log_6 68 - 8$

$v = -5.645$

$\frac{-6 \cdot 3^{10n}}{-6} = \frac{-63}{-6}$

$\log_3 3^{10n} = \log_3 10.5$

$\frac{10n}{10} = \frac{\log_3 10.5}{10}$

$x =$

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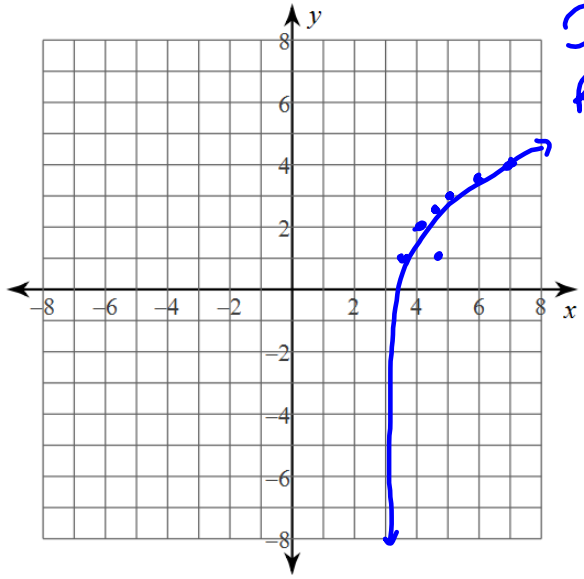
$f(x) = \log_2 (x-3) + 2$




D: $x > 3$

R: All Real #

Horizontal Shift → 3

Vertical " ↑ 2

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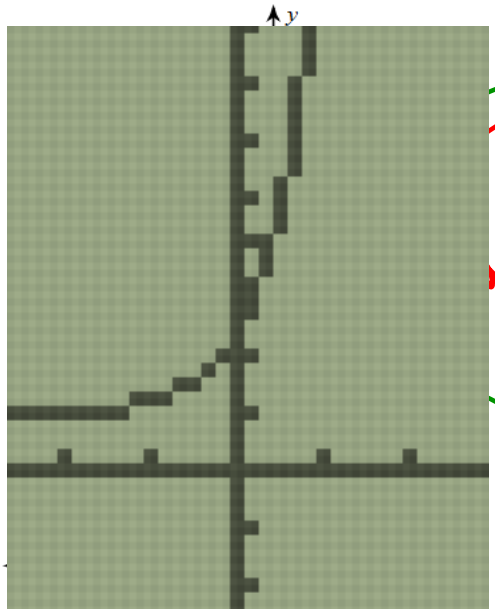
$f(x) = \frac{1}{4} \cdot 6^{x+1} + 1$




$f(x) = \frac{1}{4} \cdot 6^{x} + 1$ (+1 in the exponent, +1 outside)

Vertical Shift ↑ 1

Horizontal Shift ← 1

Vertical Compression by a factor of $\frac{1}{4}$

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## Find the inverse of each function.

$y = \frac{4^x}{3}$

$3 \cdot x = \frac{4^y}{3} \cdot 3$

$\log_4 3x = \log_4 4^y$

$\log_4 3x = y$

$f^{-1}(x) = \log_4 3x$

$y = \log_x 2 - 4$

$x = \log_y 2 - 4$

$+4 \quad +4$

$y^{x+4} = y^{\log_y 2}$

$\sqrt[x+4]{y^{x+4}} = \sqrt[x+4]{2}$

$y = \sqrt[x+4]{2^1}$

$\sqrt[2]{x^1} = x^{\frac{1}{2}}$

$y = 2^{\frac{1}{x+4}}$

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$$\sqrt[b]{x^a} = x^{\frac{a}{b}}$$

$\sqrt[10]{x^5}$ $x^{\frac{5}{10}}$ $x^{\frac{1}{2}}$

$\sqrt[5]{x^3} = x^{\frac{3}{5}}$

Dec 9-8:46 AM

$\log_7 60$

$\frac{\log 60}{\log 7}$

$\approx 2.104$

$\log_2 19$

$\frac{\log 19}{\log 2}$

$\approx 4.248$

Dec 7-10:31 PM

$$\log_3(5n-4) = \log_3(4n-1)$$

$5n-4 = 4n-1$

$-4n \quad +4 \quad -4n \quad +4$

$n = 3$

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$$\log_{17}(x^2+2) = \log_{17}(4x+2)$$

$x^2+2 = 4x+2$

$-4x \quad -2 \quad -4x \quad -2$

$x^2-4x = 0$

$x(x-4)=0$

$x=0 \quad x=4$

Dec 7-10:32 PM

$\log_4 n = 3$

$n = 4^3$

$4^3 = n$

$n = 64$

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$-7\log_7 r = 14$

$\log_7 r = -2$

$r = 7^{-2}$

$7^{-2} = r$

$r = \frac{1}{7^2} = \frac{1}{49}$

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$$7\log_{12} n + 9 = -5$$

$-9 \quad -9$

$$\frac{7\log_{12} n}{7} = \frac{-14}{7}$$

$$12^{\log_{12} n} = 12^{-2}$$

$$n = 12^{-2} \longrightarrow \frac{1}{144}$$

Dec 7-10:32 PM

$$\cancel{\log_5} -5n = -1$$

$5 \qquad 5$

$$\frac{-5n}{-5} = \frac{\frac{1}{5}}{-5}$$

$$n = -\frac{1}{25}$$

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$\log_4 (xy^4)^6$

$\log_4 (x^6 y^{24}) = \log_4 x^6 + \log_4 y^{24}$

$6\log_4 x + 24\log_4 y$

Dec 7-10:32 PM

$\log_7 (x^5 \cdot y)^2$

$\log_7 x^{10} + \log_7 y^2$

$10\log_7 x + 2\log_7 y$

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$3\log_4 u - 3\log_4 v$ ✓

$\log_4 u^3 - \log_4 v^3$

$\log_4\left(\frac{u^3}{v^3}\right)$

$\log_4\left(\frac{u}{v}\right)^3$ ✓

Dec 7-10:33 PM

$24\log_7 u + 6\log_7 v$

$\log_7 u^{24} + \log_7 v^6$

$\log_7\left(u^{24} v^6\right)$

$\log_7 (u^4 v)^6$

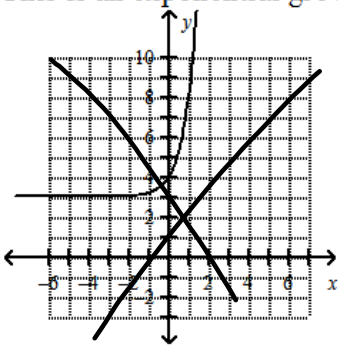
Dec 7-10:33 PM

1. Tell whether the function $y = 3(5)^x$ shows growth or decay. Then graph the function.

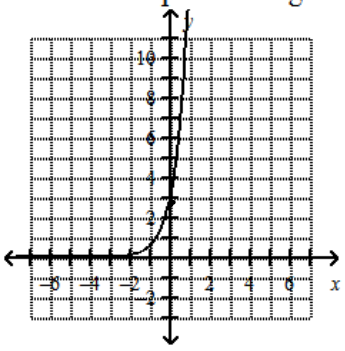
$3(5)^0$

$3(1)$

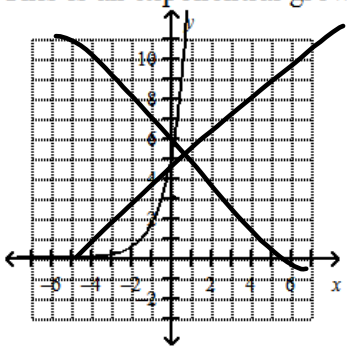
a. This is an exponential growth function.



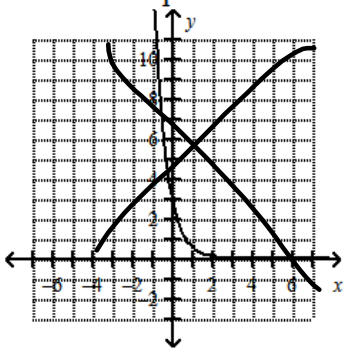
b. This is an exponential growth function.



c. This is an exponential growth function.



d. This is an exponential decay function.



Dec 9-7:10 AM

2. Determine whether $f$ is an exponential function of $x$ of the form $f(x) = ab^x$. If so, find the constant ratio.

| $x$ | −1 | 0 | 1 | 2 | 3 |
|---|---|---|---|---|---|
| $f(x)$ | $1.\overline{3}$ | 2 | 3 | 4.5 | 6.75 |

1.5 1.5 1.5 1.5

a. The data set is exponential with a constant ratio of 0.6.

b. The ratio of the successive first differences is constant. $f(x)$ is a linear function of $x$.

c. The second differences are not constant. The data set is not exponential.

d. The data set is exponential with a constant ratio of 1.5.

Dec 9-7:10 AM

3. The table shows the growth in the population of lemurs on an island over a 5-year period. Find a natural log model for the data, rounding your $a$- and $b$-values to the nearest hundredth.
Use the model to predict the year in which the lemur population will reach 500.

| Population | 222 | 292 | 340 | 366 | 382 |
|---|---|---|---|---|---|
| Year | 1 | 2 | 3 | 4 | 5 |

a. $P(t) = 202.2 + 39.4t$; year 7
b. $P(t) = 221.46 + 105.15 \ln t$; year 14
c. $P(t) = 223.08 + 101.64 \ln t$; year 15
d. $P(t) = 101.64 + 223.08 \ln t$; year 6

Dec 9-7:11 AM

6. Simplify $\ln e^{-4x}$.

a. $-4$
b. $e^{-4}$
c. $e^{-4x}$
d. $-4x$

Dec 9-7:11 AM

4. Mira bought \$300 of Freerange Wireless stock in January of 1998. The value of the stock is expected to increase by 7.5% per year. Use a graph to predict the year the value of Mira's stock will reach \$700.

a. 1999
b. 2009
c. 2014
d. 2004

1998
11
2009

$Pe^{rt}$

$700 = 300e^{.075t}$

$\frac{700}{300} = e^{.075t}$

$\ln\frac{7}{3} = .075t$

$\frac{\ln\frac{7}{3}}{.075} = \frac{.075t}{.075}$

$t = 11.29$

Dec 9-7:11 AM

5. Use inverse operations to write the inverse of $f(x) = \frac{x}{5} + 4$.

$x = \frac{y}{5} + 4$

$5(x-4) = \frac{y}{5} \cdot 5$

$f^{-1}(x) = 5(x-4)$

a. $f^{-1}(x) = \frac{x}{5} - 4$
b. $f^{-1}(x) = 5x - 4$
c. $f^{-1}(x) = 5(x-4)$
d. $f^{-1}(x) = 4x - 5$

Dec 9-7:11 AM

7. Nadav invests $6,000 in an account that earns 5% interest compounded continuously. What is the total amount of her investment after 8 years? Round your answer to the nearest cent.

$6000e^{.05(8)}$ $N_0e^{-rt}$

a. $9850.95

~~b. $14,950.95~~

~~c. $327,588.90~~

d. $8950.95

100
5
105 %

Dec 9-7:11 AM

8. ~~Radioactive iodine treatment is so successful at treating hyperthyroidism that it has virtually replaced thyroid surgery~~. To the nearest full day, determine how long it will take for 400 millicuries of I-131, which has a half-life of 8 days, to decay to 3.125 millicuries.

$\frac{1}{2} = 1e^{-r8}$

$\ln\frac{1}{2} = e^{-8r}$

$\frac{\ln\frac{1}{2}}{-8} = \frac{-8r}{-8}$

$\frac{3.125}{400} = \frac{400e^{-.0866t}}{400}$

$\frac{3.125}{400} = e^{-.0866t}$

$\ln\frac{3.125}{400} = -.0866t$

a. 8 days

b. 128 days

c. 56 days

d. 7 days

.086643976

$\frac{\ln(\frac{3.125}{400})}{-.0866} = 56.$

Dec 9-7:12 AM

9. $f(x) = 0.2^x$ is transformed 6 units left, compressed vertically by a factor of $\frac{1}{6}$, and reflected across the $x$-axis. Write the transformed function $g(x)$.

a. $g(x) = \left(-\frac{1}{6}\right)0.2^{x+6}$

b. $g(x) = \left(\frac{1}{6}\right)0.2^{-x-6}$

c. $g(x) = \left(-\frac{1}{6}\right)0.2^{x-6}$

d. $g(x) = 0.2^{6(x+6)}$

Dec 9-7:12 AM

10. What function is vertically stretched by a factor of 4 and translated 3 units right from the parent function?

a. $f(x) = 5^{4x-3}$

b. $f(x) = 4\log_5(x-3)$

c. $f(x) = \log_5(4x+3)$

d. $f(x) = 4(5^{x+3})$

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11. The table shows US Department of Agriculture estimates of the number of acres defoliated by gypsy moths in Massachusetts during the years 1978 to 1981, the first four years of a major gypsy moth epidemic. Find an exponential model for the data. Use the model to predict the number of thousands of acres defoliated by gypsy moths in 1982, the fifth year of the epidemic.

| Epidemic Year | Thousands of Acres |
|---|---|
| 1 | 63 |
| 2 | 226 |
| 3 | 907 |
| 4 | 2,826 |

a. $A(y) = 50.97y^{2.70}$; 3931
b. $A(y) = 439y^2 - 1298y + 958$; 5443
c. $A(y) = 897y - 1237$; 3248
d. $A(y) = 17.82(3.60)^y$; 10,775

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Dec 7-10:35 PM