

C12 - 8.1 - $\log_b a = ?$ Definition HW

Evaluate. Think of what power must you raise the base to in order to equal the "thing you are logging".

$\log_2 8 = 3$	$\log_2 16 =$	$\log_3 9 =$	$\log_2 1024 =$
$\log_2 4 =$	$\log_2 64 =$	$\log_2 32 =$	$\log_3 27 =$
$\log_4 16 =$	$\log_1 49 =$	$\log_{10} 100 =$	$-\log_2 16 =$
$\log_5 0 =$	$\log_0 3 =$	$\log_7 1 =$	$\log_2 \left(\frac{1}{4}\right) =$
$\log_{\frac{1}{4}} 16 =$	$\log_{\frac{1}{2}} 8 =$	$\log_4 2 =$	

Evaluate. Think of what power must you raise the base to in order to equal the "thing you are logging".

$\log_3 3^2 =$	$\log_2 2^4 =$	$\log_4 4^3 =$	$\log_5 5^x =$
$\log_5 5^{78} =$	$\log_3 3^{\frac{1}{2}} =$	$\log_a a^2 =$	$\log_x x^5 =$

Change the base of the "thing you are logging" to be the same as the base of the log, and evaluate as above.

$\log_2 4 =$	$\log_3 27 =$	$\log_5 125 =$	$\log_6 36 =$
$\log_2 16 =$	$\log_8 512 =$	$\log_5 \sqrt[3]{5} =$	$\log_6 \frac{1}{6} =$

Use your calculator to evaluate.

$\log 7 =$	$\log 0.05 =$	$\log 80 =$	$\log 0 =$
$\log(-2) =$			

Evaluate

$\log_a a =$	$\log_x 1 =$	$\log_{2a} 4a^2 =$	$\log_b b^x =$
$\log_{2x} 8x^3 =$	$\log_e e^2 =$	$\ln e^2 =$	

Evaluate

$\log \sqrt{10} =$	$\log 1 =$	$\log 1000 =$	$\log 0.1 =$
$\log_{100} 10\,000 =$			

C12 - 8.1 - $\log_b a = c$ in Exp/Log Form HW

Express in exponential form

$$\log_2 8 = 3$$

$$\log_5 25 = 2$$

$$\log_3 27 = 3$$

$$\log_a b = c$$

$$\log_6 1 = 0$$

$$\log_2 \left(\frac{1}{2}\right) = -1$$

$$\log_{10} 1000 = 3$$

$$\log_4 2 = \frac{1}{2}$$

$$\log_{\frac{1}{4}} \left(\frac{1}{16}\right) = 2$$

$$\log_{\frac{1}{3}} 9 = -2$$

$$\log_7(x + 2) = y$$

$$\log 100 = 2$$

$$\log_4 1 = 0$$

$$1 = \log_5 5$$

$$\log_{64} 16 = \frac{2}{3}$$

$$q = \log_x z$$

$$\log_2 4 + 2 = 4$$

Express in logarithmic form

$$2^3 = 8$$

$$5^2 = 25$$

$$64 = 8^2$$

$$8^{\frac{1}{3}} = 2$$

$$2^6 = 64$$

$$10^{-2} = 0.01$$

$$a = b^c$$

$$6^{-2} = \frac{1}{36}$$

$$1000 = 10^3$$

$$4^{-2} = \frac{1}{16}$$

$$\frac{1}{125} = 5^{-3}$$

$$x^y = z$$

$$18^0 = 1$$

$$4^1 = 4$$

$$\left(\frac{1}{5}\right)^2 = \frac{1}{25}$$

C12 - 8.1 - $\log_b x = c, \log_x a = c$ HW

Find x

$$\log_2(x) = 3$$

$$\log_4 x = 3$$

$$\log_5 x = 2$$

$$\log_4 x = \frac{1}{2}$$

$$\log_5 x = 0$$

$$\log_5 x = -2$$

$$\log_3 x = -2$$

$$\log_{\sqrt{2}} x = 4$$

$$\log_2(x + 2) = 2$$

$$\log_3(x - 5) = 2$$

$$\log_{10}(x - 50) = 2$$

$$\log_5(20 + x) = 2$$

$$\log_5(x^2 + 50) = 3$$

$$\log_3(44 - x) = 4$$

$$\log_3(5x + 7) = 2$$

$$\log_5 2x = -5$$

$$\log_x(8) = 3$$

$$\log_x(144) = 2$$

$$\log_x(81) = 2$$

$$\log_x 5 = 1$$

$$\log_x 5 = 3$$

$$\log_x 125 = 3$$

$$\log_x \frac{1}{16} = 4$$

$$\log_x(64) = 3$$

$$\log_x 9 = \frac{1}{2}$$

$$\log_x 8 = \frac{2}{3}$$

$$\log_x 27 = \frac{3}{2}$$

$$\log_x \sqrt{27} = \frac{3}{2}$$

$$\log_x 4 = \frac{2}{3}$$

$$\log_x \frac{27}{8} = \frac{3}{2}$$

$$\log_x \frac{64}{27} = \frac{3}{2}$$

C12 - 8.1 - $\log_b a = x$ and Factoring HW

Solve

$$\log_4(16) = x$$

$$\log_8 16 = x$$

$$\log_2 64 = x$$

$$\log_2(8) = x$$

$$\log_{10} 100 = x$$

$$\log_7(343) = x$$

$$\log_4 \frac{1}{8} = x$$

$$\log_{\frac{1}{5}} 125 = x$$

$$\log_{81} 3 = x$$

$$\log_{16} 8 = x$$

$$\log_{\frac{1}{2}} 16 = x$$

$$\log_{\frac{1}{2}} 1 = x$$

$$\log_{\frac{1}{3}} \frac{1}{9} = x$$

$$\log_{\frac{1}{9}} \frac{1}{3} = x$$

$$\log_{\sqrt{2}} 4 = x$$

$$\log_2 \sqrt[4]{8} = x$$

$$\log_{2x} 16 = 2$$

$$\log_{x+1} 9 = 2$$

$$\log_{x+2} 1 = 2$$

$$\log_{x-1} 4 = 2$$

$$\log_{x+2} 9 = 2$$

C12 - 8.2 - Logs Restrictions HW

State Restrictions

$$\log x = 5$$

$$\log(x + 1) = 3$$

$$\log_2(2x - 3) = 5$$

$$\log_2(-x) = 5$$

$$\log_2(3 - x) = 5$$

$$\log_x 3 = 7$$

$$\log_{x-1} 2 = 4$$

$$\log_3(x^2 - 1) = 5$$

$$\log_3(x^2 - 9) = 5$$

$$\log_3(x^2 + 4) = 5$$

$$\log_x(x - 2) = 5$$

$$\log_x(x + 3) = 5$$

$$\log_2 x^2 = 4$$

$$2 \log_2 x = 4$$

C12 - 8.3 - $\log a^m = m \log a$ Change of Base HW

Bring Exponent down in front and vice versa/both where allowed. Multiply/Distribute if necessary. Get rid of fractions and decimals.

$$\log 6^3$$

$$\log 9^x$$

$$\log 5^{\frac{1}{3}}$$

$$\log \sqrt{5}$$

$$\log \left(\frac{1}{3} \right)$$

$$\log 0.1$$

$$2 \log 5^3$$

$$2 \log 5^3$$

$$7 \log 8^4$$

$$7 \log 8^4$$

$$\log 2x^3$$

$$\log (2x)^3$$

$$\log ab^2$$

$$\log (ab)^2$$

$$2 \log 3^{x-3}$$

$$2 \log 3^{x-3}$$

$$\log 9^{x+1}$$

$$\log 3^{2x+5}$$

Change Forms

$$\frac{\log 8}{\log 2} =$$

$$\frac{\log_2 64}{\log_2 4} =$$

$$\log_3 81 =$$

$$\log_5 25 =$$

$$\log_9 27 =$$

$$\log_{16} 64 =$$

$$\frac{1}{\log_{81} 3} =$$

$$\frac{1}{\log_{64} 4} =$$

C12 - 8.3 - Rule 6 $\log_b^n a^n$ HW

Square the base and the log and evaluate

$$\log_3 9$$

$$\log_2 4$$

$$\log_5 125$$

$$\log_7 49$$

Take the base and the log to the exponent -1 and evaluate

$$\log_{\frac{1}{2}} 8 =$$

$$\log_{\frac{1}{3}} 9 =$$

$$\log_{\frac{1}{4}} \frac{1}{2} =$$

$$\log_{\frac{1}{2}} \frac{1}{4} =$$

Cube the base and the log

$$\log_2 4 =$$

$$\log_3 4 =$$

Change the base to 3

$$\log_9 64 =$$

$$\log_{27} 8 =$$

$$\log_{\sqrt{3}} 2 =$$

Change the base to 4

$$\log_2 4 =$$

$$\log_{16} 25 =$$

$$\log_{\sqrt[3]{4}} 3 =$$

C12 - 8.3 - Rule 6 $\log_b^n a^n$ Equations HW

$$\log_2 x + \log_4 x = 3$$

$$2\log_3 x - \log_9 x^2 = 2$$

$$(\log_2 x)(\log_3 4) = 4$$

$$(\log_x 36)(\log_6 27) = 6$$

$$(\log_5 16)(\log_4 25) = x$$

$$(\log_5 x)(\log_4 25)(\log_7 16) = 8$$

$$C12 - 8.4 - \log_b m + \log_b n = \log_b mn, \log_b m - \log_b n = \log_b \frac{m}{n} \text{ HW}$$

Simplify, express as a single log

$$\log 3 + \log 4 =$$

$$\log_2 5 + \log_2 6 =$$

$$\log_3 20 - \log_3 4 =$$

$$2 \log_4 8 - \log_4 16 =$$

$$\log_2 32 - 3 \log_2 2 =$$

$$\log_2 5 + \log_2 3 + \log_2 4 =$$

$$\log_2 4 + \log_2 5 - 2 \log_2 10 =$$

$$\log_3 4 + 2 \log_3 20 - \log_3 10 =$$

$$\log 5 - \log 2 - \log 10 =$$

$$\log 5 - \log 2 + \log 10 =$$

$$\log 4 - \log 2 + \log 10 =$$

$$-\log 8 - \log 2 + \log 5 =$$

Express as an addition of logs

$$\log(4 \times 3) =$$

$$\log(2 \times 5 \times 7)$$

$$\log 4 =$$

$$\log 9 =$$

$$\log 10 =$$

$$\log 15 =$$

$$\log 21 =$$

$$\log 25 =$$

$$\log 30 =$$

$$\log 36 =$$

$$\log 20 =$$

Express as a subtraction of logs

$$\log\left(\frac{10}{3}\right) =$$

$$\log\left(\frac{3}{2}\right) =$$

$$\log 5 =$$

$$\log 7 =$$

$$\log 0.1 =$$

$$\log 0.5$$

$$C12 - 8.4 - \log_b m + \log_b n = \log_b mn \quad \log_b m - \log_b n = \log_b \frac{m}{n} \quad HW$$

Express in terms of $\log a, \log b, \log c$

$$\log ab =$$

$$\log\left(\frac{b}{c}\right) =$$

$$\log\left(\frac{a}{bc}\right) =$$

$$\log\left(\frac{ab}{c}\right) =$$

$$\log 100a^2b^3 =$$

$$\log_4 \frac{16a^2}{c} =$$

$$\log\left(\frac{a^3}{b\sqrt{c}}\right) =$$

$$\log \frac{c^2}{10a^2} =$$

$$\log(bc)^2 =$$

$$\log(a\sqrt{b}) =$$

$$\log(\sqrt{ab}) =$$

$$C12 - 8.4 - \log_b m + \log_b n = \log_b mn \quad \log_b m - \log_b n = \log_b \frac{m}{n} \quad HW$$

Express in terms of $\log 3$ and $\log 4$.

$$\log 12 =$$

$$\log 36 =$$

$$\log 48 =$$

$$\log 120 =$$

$$\log 0.12 =$$

$$\log \frac{9}{16} =$$

Simplify the expression.

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

$$\log(x^2) - \log x =$$

$$\log n^2 - 2\log \sqrt{n} =$$

$$\log \sqrt{m} + \log m^{\frac{3}{2}} =$$

$$\log_2 x - 2\log_2 8 =$$

$$\log_3 x + 2\log_3 4 =$$

$$\log(x+2) + \log(x+3) =$$

$$\log(x^2 + 5x + 6) - \log(x+3) =$$

C12 - 8.4 - $\log 2 = m, \log 3 = n$, HW

Given: $\log 2 = m$ $\log 3 = n$ Solve in terms of m and n :

$$\log 4 =$$

$$\log 6 =$$

$$\log 8 =$$

$$\log 24 =$$

$$\log 18 =$$

$$\log 12 =$$

$$\log 20 =$$

$$\log 600 =$$

$$\log 0.3 =$$

$$\log 2x =$$

$$\log 9x =$$

$$\log 0.02 =$$

$$\log 1.5 =$$

$$\log 0.\bar{6}$$

$$\log 1.08 =$$

$$\log 0.06 =$$

$$\log 0.54 =$$

$$\log 5 =$$

$$\log_{\frac{1}{2}} 216$$

$$\log_{12} 72 =$$

$$\log_6 1728$$

Given: $\log 9 = a$ $\log 25 = b$ Solve in terms of a and b :

$$\log 3 =$$

$$\log 15 =$$

$$\log \frac{3}{5} =$$

$$\log 300 =$$

$$\log 1.\bar{6} =$$

C12 - 8.5 - Log Operation HW

Solve using your calculator or your brain.

$$\log 5 =$$

$$\log 10 =$$

$$\log 240 =$$

$$\log 0 =$$

$$\log 100 =$$

$$\log 4528 =$$

$$\log 1 =$$

$$\log 0.2 =$$

$$\log 20 =$$

$$\log - 1 =$$

$$\log 1000 =$$

$$\log 9 =$$

$$\log .01 =$$

$$\log 85 =$$

$$\log 0.1 =$$

$$\log 12345 =$$

$$\log 10^{12345} =$$

$$\log_5 12 =$$

$$\log_8 3 =$$

$$\log_2 8192 =$$

$$\log_2 128 =$$

$$\log 12^3 =$$

$$\log 25^2 =$$

$$\log 100^2 =$$

$$\log 10^{-2} =$$

$$2\log 6^4 =$$

$$-\log 5^2 =$$

$$3\log 6^{-4} =$$

$$2\log 10^{\frac{1}{2}} =$$

$$3\log 12 =$$

$$2\log 25 =$$

$$2\log 100 =$$

$$-2\log 10 =$$

Expand: Bring Exponent down in front and distribute

$$\log 3^{x+4} =$$

$$\log 8^{2x-1} =$$

$$\log 8^{-x+1} =$$

$$2\log 4^{x+2} =$$

Remove a greatest common Factor of x

$$2x\log 5 - x\log 3 =$$

$$x\log 7 - x\log 2 =$$

$$x\log 20 - x\log 2 =$$

C12 - 8.5 - Log = Log De-Log Equation HW

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

$$\log_2 x = \log_2(3 - x)$$

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

$$\log x = \log(x^2 - 2)$$

$$\log 2x = \log(x - 3)$$

$$\log_5(4x + 3) = \log_5(3x - 2)$$

$$\log 6 = \log x - \log 3$$

$$\log 24 = \log x + \log 3$$

$$\log 8 = \log 2 - \log x$$

$$\log x + \log x = \log 4$$

$$\log_4 x + \log_4 x^2 = \log_4 27$$

$$\log_7 3x = \log_7(x^2 - 4)$$

$$\log x^2 + \log x^2 = \log 81$$

$$3 \log x + \log x = \log 256$$

$$2 \log x + \log x^2 = \log 9$$

$$\log x^2 - \log x = \log 5$$

$$3 \log_7 x + \log_7 x^2 = \log_7 32$$

$$5 \log_9 x - \log_9 x^2 = \log_8 8$$

$$3 \log_9 x + \log_9 x^2 = \log_9 32$$

$$\log_3(x - 2) + \log_3(x - 3) = \log 12$$

$$\log_3(6x + 1) - \log_3(x - 1) = \log 5$$

$$\log_3(3x + 1) - \log_3(x - 2) = \log 4$$

C12 - 8.5 - Log Equation HW

$$\log_2 x + \log_2 x = 2$$

$$\log_4 x = 3 - \log_4 x$$

$$\log_2 x + \log_2 x^2 = 6$$

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

$$\log_x 5 + \log_x 2 = 3$$

$$\log_{x^2} 128 = \log_{x^2} 2 + 3$$

$$\log_5(x^2 - 1) = \log_5(x + 1) + 2$$

$$\log_{x+1} 27 - \log_{x+1} 3 = 2$$

$$\log_2 5x - \log_2(x + 1) = 2$$

$$\log_{x-1} 1 + \log_{x-1} 4 = 2$$

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

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

$$\log_3 2x - \log_3(x - 2) = 1$$

$$\log_3(3x - 12) - \log_3 x = 2$$

C12 - 8.5 - Log Equation HW

$$\log_3 2x - \log_3(x - 2) = 1$$

$$\log_3(3x - 12) - 2 = \log_3 x$$

$$\log_2 x + \log_2(x - 7) = 3$$

$$\log_2 x + \log_2(x + 1) = 1$$

$$\log_2(2x + 4) = \log_2(x + 2) + 2$$

$$\log_2 x + \log_2(x + 4) = 5$$

$$\log_3 x + \log_3(x + 2) = 1$$

$$\log_3 x + \log_3(x - 6) = 3$$

$$\log_6 x + \log_6(x - 5) = 2$$

$$\log_3(x^2 + 5x + 6) - \log_3(x + 2) = 1$$

$$2 \log_5(x + 2) - \log_5(x + 2) = 1$$

$$\log_7(2x^2 + 7x + 6) - \log_7(x + 2) = 2$$

C12 - 8.5 - Logs Factoring WS

$$(\log x)^2 + \log x = 2$$

$$(\log x)^2 = \log x^5 + 4$$

$$2(\log x)^2 - 3\log x = -1$$

$$(\log x)^2 - 9 = 0$$

$$(\log x)^2 = 4$$

$$(\log x)^2 - 7 = \log x^6$$

C12 - 8.6 - Log Both Sides HW

Solve for x

$$4 = 2^x$$

$$12 = 2^x$$

$$99 = 10^x$$

$$38 = 6^x$$

$$4 = 3^x$$

$$14 = 2^x$$

$$267 = 10^x$$

$$0.2 = 6^x$$

$$5 = 4^x$$

$$30 = 5^x$$

$$27 = 5^x$$

$$9^x = 76$$

$$7 = 2^{2x}$$

$$80 = 3^{2x}$$

$$1080 = 2^{5x}$$

$$180 = 5^{\frac{x}{2}}$$

$$5 = 2^{\frac{1}{x}}$$

$$\frac{2}{7^x} = 9$$

$$18 = 2^{\frac{3}{x+1}}$$

$$40 = 5(3)^x$$

$$60 = 3(2)^x$$

C12 - 8.6 - Log Both Sides HW

$$4^{x+1} = 12$$

$$25 = 3^{x-2}$$

$$126 = 3^{x+1}$$

$$80 = 2^{3x-1}$$

$$2^{3-x} = 5^{x-2}$$

$$2^{2x-3} = 8^{x-1}$$

$$3^{2x+1} = 5^{x+1}$$

$$120 = 6(2)^{x+1}$$

$$80 = 4(2)^{3x-1}$$

$$25 = 4(3)^x$$

$$62 = 5(3)^{2x-1}$$

C12 - 8.6 - Rule 7 $b^{\log_b x} = x$ Log HW

$$2^{\log_2 5} = x$$

$$3^{\log_3 8} = x$$

$$2^{2\log_4 6} = x$$

$$3^{2\log_3 4} = x$$

$$4^{\log_2 6} = x$$

$$2^{\log_4 32} = x$$

$$2^{\log x} = \frac{1}{4}$$

$$2^{-\log x} = 8$$

$$3^{\log 2x} = \frac{1}{27}$$

C12 - 8.6 - Word Problem Notes

How long to earn \$2000
on \$50000 at 8%/year?

How long to double your
money at 5%/year?

How long to grow \$100
to \$2000 compounded
semi-annually at 6%?

An earthquake of magnitude 7 is
300 times as intense as an earth
quake of what magnitude?

How long to grow 500 Bacteria
to 10000 at a continuous growth
rate of 0.07?

Find the half-life of a
substance decaying to 15% of
its original in 80 years?

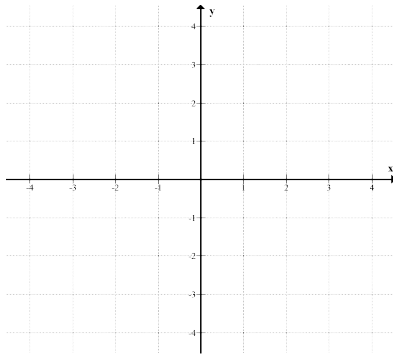
A substance has a half-life of 8
years. How long to be twenty
percent of its original?

C12 - 8.7 - Graph Log HMK

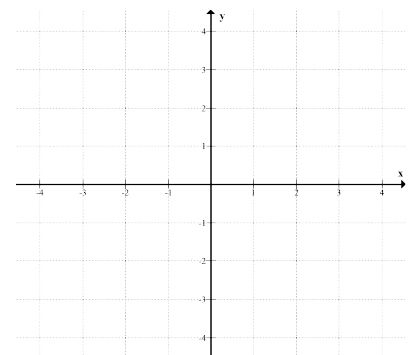
Graph and state Vertical Asymptote and Domain

$$y = \log_2 x$$

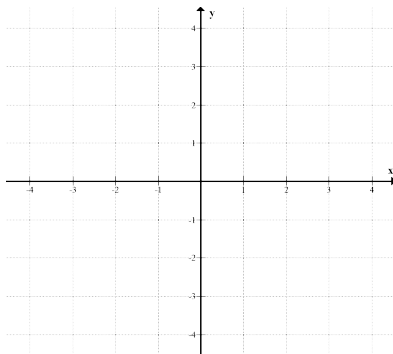
x	y



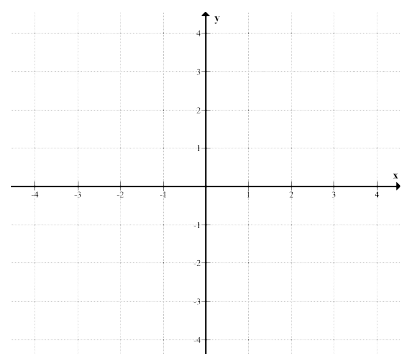
$$y = \log_3 x$$



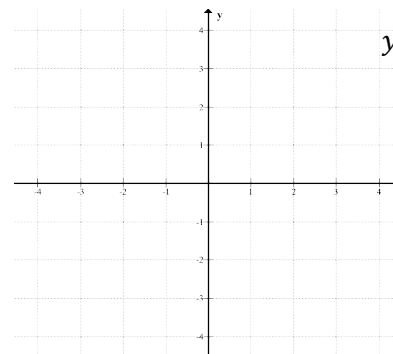
$$y = \log_2 x + 1$$



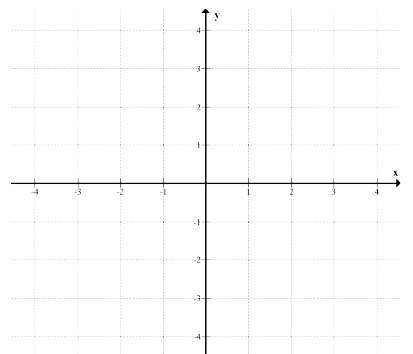
$$y = \log_3(1 - x)$$



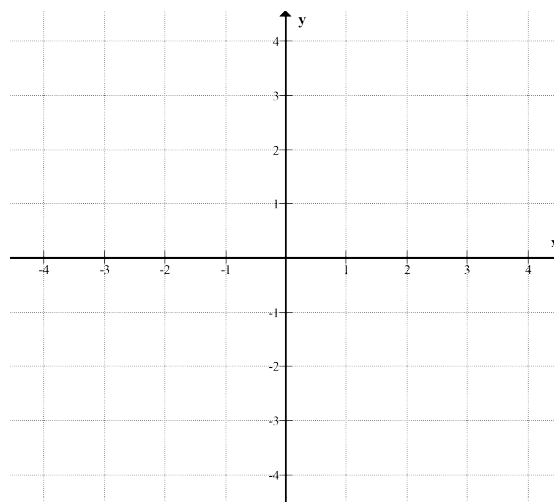
$$y = -\log_2 x$$



$$y = 2\log_3(x + 2) - 3$$



$$y = -\log_3(2x + 2) + 1$$



C12 - 8.8 - Find Inverse HW

Determine the inverse of the following

$$y = 8^x$$

$$y = 10^{x-2}$$

$$y = 5^{2x}$$

$$y = 3^{x+3}$$

$$y = 6^x + 7$$

$$y = 2^{2x-3} - 5$$

$$y = \log_4 x$$

$$y = \log_5(2x + 2)$$

$$y = \log_2(x + 3)$$

$$y = 5 - \log_3 2x$$

$$2 + y = \log_2(x)$$