43.) $y = 3e^x$

x	y
-1	1.1
0	3
1	8.2

D: $(-\infty, \infty)$

R: $(0, \infty)$

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

$g(x) = 5\left(\frac{1}{4}\right)^x = 5 \cdot 4^{-x}$

4.4: Graphing log functions

a. $\log_2 32$

5

b. Solve: $\log_2(x - 2) = 4$

2^4

$x - 2 = 16$

$x = 18$

c. Condense: $2\log x - 3\log y + 8\log w$

$\log x^2 - \log y^3 + \log w^8$

$\log \frac{x^2 w^8}{y^3}$

What is the relationship between $f(x)=3^x$ and $g(x)=\log_3 x$?

they are inverses

$(f \circ g)(x) = x$ and $(g \circ f)(x) = x$

$3^{\log_3 x}$

x

$\log_3 3^x$

$x \log_3 3$

x

$f(x) = 3^x$

x	y
-1	$1/3$
0	1
1	3

HA @ $y = 0$

horizontal asymptote

D: $(-\infty, \infty)$

R: $(0, \infty)$

$g(x) = \log_3 x$

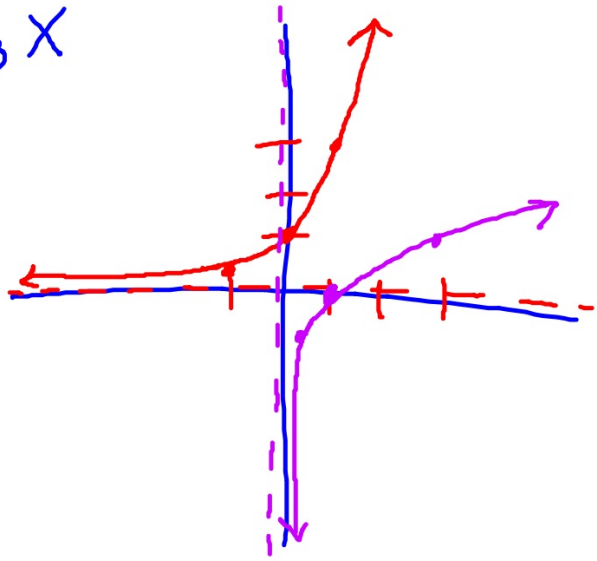
x	y
$1/3$	-1
1	0
3	1

VA @ $x = 0$

vertical asymptote

D: $(0, \infty)$

R: $(-\infty, \infty)$



Find the inverse.

1 $f(x) = \ln(x-2) + 4$

$y = \ln(x-2) + 4$

$x = \ln(y-2) + 4$

$e^{(x-4)} = e^{\ln(y-2)}$

$e^{x-4} = y - 2$

$e^{x-4} + 2 = y$

$\boxed{f^{-1}(x) = e^{x-4} + 2}$

1. switch the x and y
2. isolate the log
3. take the approp. base of both sides
4. solve for y

② $g(x) = 2 \cdot (3)^{x-5}$

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

$$\log_3 \frac{x}{2} = \cancel{\log_3} 3^{y-5}$$

$$\log_3 \frac{x}{2} = y - 5$$

$$\log_3 \frac{x}{2} + 5 = y$$

$$g^{-1}(x) = \log_3 \frac{x}{2} + 5$$

$$\log \frac{x}{2} = \cancel{\log} 3^{y-5}$$

$$\frac{\log \frac{x}{2}}{\log 3} = \frac{(y-5)\cancel{\log 3}}{\cancel{\log 3}}$$

$$\log_3 \frac{x}{2} = y - 5$$

$$\log_3 \frac{x}{2} + 5 = y$$

Sketch. State the domain and range.

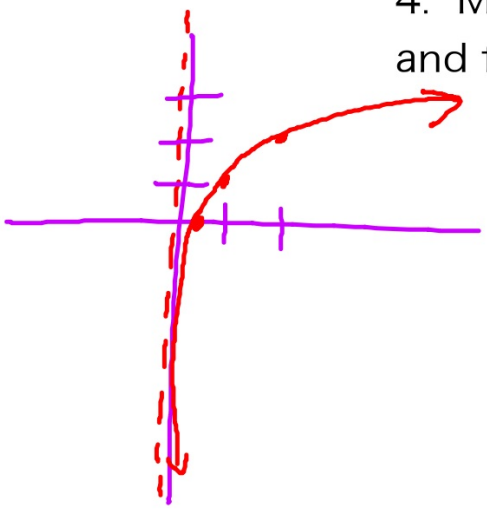
3 $y = \log_2(x) + 1$

1. Isolate the log
2. Change to exponential form
3. solve for x
4. Make a table. Pick y-values and find the x-values

$y - 1 = \log_2 x$

$2^{y-1} = x$

x	y
1/2	0
1	1
2	2



D: $(0, \infty)$

R: $(-\infty, \infty)$

function is increasing

State the domain and the asymptote.

$y = \log_3(x+4) - 1$

Asymp.

$x + 4 = 0$

$x = -4$

Domain

$(-4, \infty)$

$y = \log_2(x-3)$

Asymp.

$x = 3$

Domain

$(3, \infty)$

$y = \log_4(7-3x) - 8$

Asympote

$7 - 3x = 0$

$\frac{7}{3} = x$

Domain

$(-\infty, \frac{7}{3})$

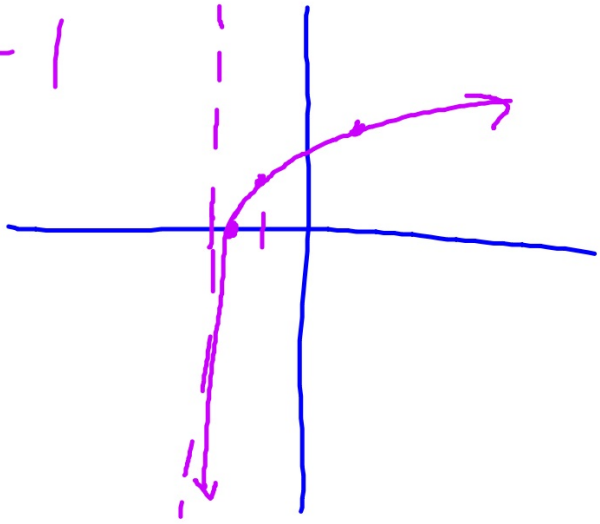
④ $y = \log_3(x+2) + 1$

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

$3^{y-1} = x+2$

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

x	y
$-5/3$	0
-1	1
1	2



VA @ $x = -2$

D: $(-2, \infty)$

R: $(-\infty, \infty)$

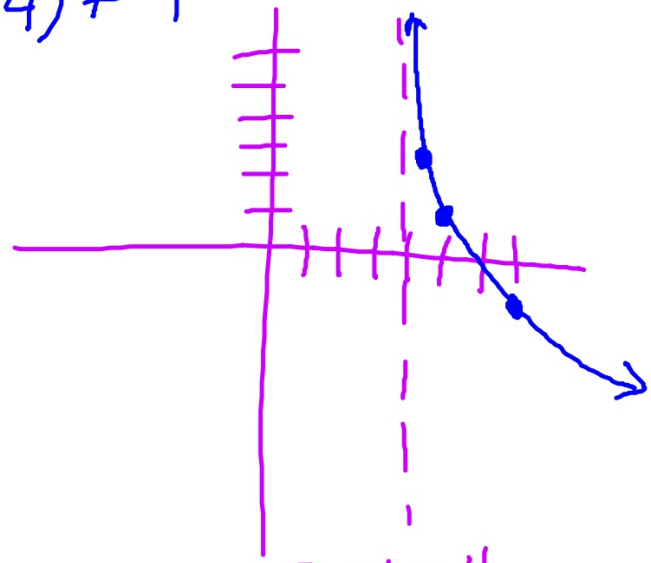
increasing

5 $y = 2\log_{1/3}(x-4) + 1$

$$\frac{y-1}{2} = \log_{1/3}(x-4)$$

$$\left(\frac{1}{3}\right)^{\frac{y-1}{2}} + 4 = x$$

x	y
5	1
$4\frac{1}{3}$	3
7	-1



VA @ $x = 4$

D: $(4, \infty)$

R: $(-\infty, \infty)$

decr.

Solve: $3^{2x} - 3^{x} - 42 = 0$

$x^2 - x - 42$

$(x-7)(x+6)$

$(3^x - 7)(3^x + 6) = 0$

$3^x - 7 = 0$

$3^x + 6 = 0$

$\cancel{3^x = -6}$

$\log 3^x = \log 7$

$x \log 3 = \log 7$

$x = \frac{\log 7}{\log 3}$

$x = \log_3 7$