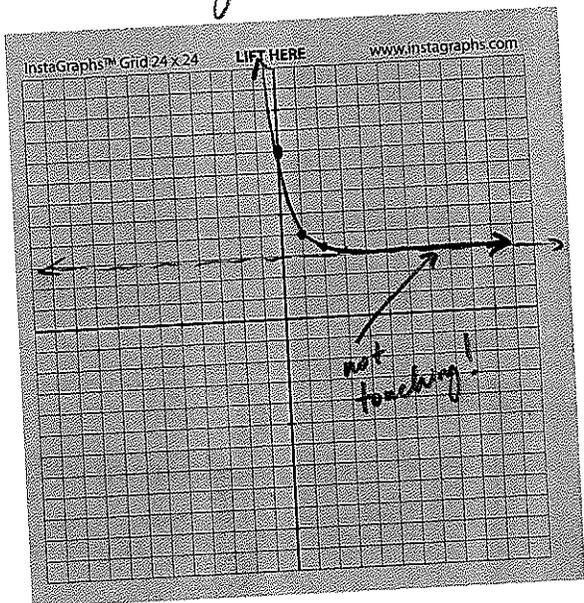


Logs Review

1 a) Domain: $x \in \mathbb{R}$
 Range: $y > 3$
 Asymptote Equation: $y = 3$ } $f(x) = \left(\frac{1}{5}\right)^{x-1} + 3$



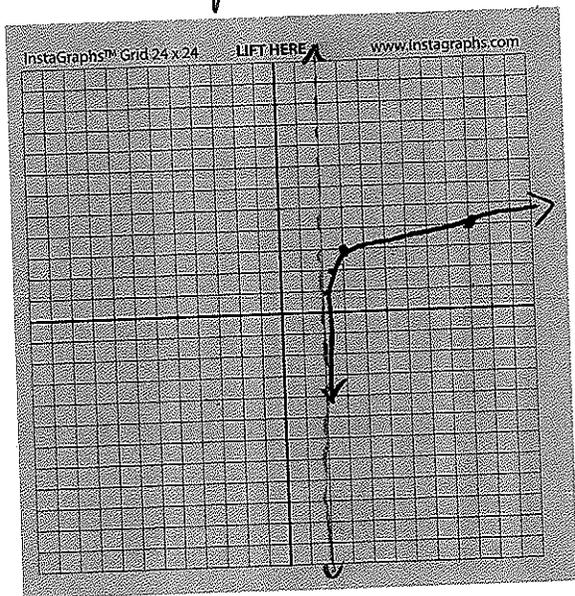
x	y
1	4
2	$\frac{16}{5}$
0	8
-1	28
3	$\frac{76}{25}$

← apply transformations

x	y
0	1
1	$\frac{1}{5}$
-1	5
-2	25
2	$\frac{1}{25}$

$y = \left(\frac{1}{5}\right)^x$

b) Domain: $x > 2$
 Range: $y \in \mathbb{R}$
 Asymptote Equation: $x = 2$ } $f(x) = \log_7(x-2) + 3$



x	y
3	3
9	4
51	5
$\frac{15}{7}$	2
$\frac{99}{49}$	1

← apply transformations

x	y
1	0
7	1
49	2
$\frac{1}{7}$	-1
$\frac{1}{49}$	-2

$y = \log_7 x$

2. (a, b) on $f(x) = 5^x$; $b = 5^a$

a) $f(x) = \log_5 x$

$$\boxed{(b, a)}$$

Since $y = 5^x$ has inverse of:

$$x = 5^y$$

$$\log_5 x = y \log_5 5$$

$$\log_5 x = y (1)$$

$$y = f^{-1}(x) = \log_5 x$$

b) $f(x) = \log_5 (-x) \rightarrow$ reflection about y -axis

$$\boxed{(-b, a)}$$

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

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

$$2x = \frac{\log 5}{\log 3} \rightarrow x = \frac{\log 5}{2 \log 3} = \boxed{0.732}$$

$$2x = \log_3 5$$

$$\boxed{x = \frac{\log_3 5}{2}}$$

$$4. (\sqrt{b})^{6x+2} = (b^3)^{2x-5}$$

$$(b^{\frac{1}{2}})^{6x+2} = (b^3)^{2x-5}$$

$$\frac{b^{3x+1}}{b^{3x+1}} = \frac{b^{6x-15}}{b^{3x+1}}$$

$$1 = b^{3x-16}$$

$$\log 1 = (3x-16) \log b$$

$$0 = (3x-16)(\log b)$$

$$3x-16 = 0$$

$$\boxed{x = \frac{16}{3}}$$

$$5. \log_5(y+2) = x+1$$

x-ints: set $y=0$

$$\log_5(0+2) = x+1$$

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

$$\frac{\log 2}{\log 5} = x+1$$

$$x = \frac{\log 2}{\log 5} - 1$$

$$x = \frac{\log 2 - \log 5}{\log 5}$$

$$\boxed{x = \frac{\log(\frac{2}{5})}{\log 5}} = \boxed{\log_5\left(\frac{2}{5}\right)}$$

y-int: set $x=0$

$$\log_5(y+2) = 0+1$$

$$\log_5(y+2) = 1$$

$$\frac{\log(y+2)}{\log 5} = 1$$

$$\log(y+2) = \log 5$$

$$\boxed{y = 3}$$

$$6. \quad A = P \left(1 + \frac{r}{n}\right)^{nt}$$

$$\begin{array}{cc} \text{Amy} & \text{Eric} \\ 2000 \left(1 + \frac{0.09}{1}\right)^{1(t)} = A = 3000 \left(1 + \frac{0.06}{1}\right)^{1(t)} \end{array}$$

$$2000 (1.09)^t = 3000 (1.06)^t$$

$$1.09^t = 1.5 (1.06)^t$$

$$t \log 1.09 = \log 1.5 + t \log 1.06$$

$$t (\log 1.09 - \log 1.06) = \log 1.5$$

$$t = 14.5 \text{ yrs.}$$

$$7. \quad f(x) = 8^{x-2}$$

$$y = 8^{x-2}$$

$$x = 8^{y-2}$$

$$\log x = (y-2) \log 8$$

$$y-2 = \frac{\log x}{\log 8}$$

$$y = \frac{\log x}{\log 8} + 2$$

$$y = \frac{\log x + 2 \log 8}{\log 8}$$

$$y = \frac{\log x + \log 64}{\log 8}$$

$$y = \frac{\log 64x}{\log 8}$$

or

$$y = \log_8 64x$$

$$8. \quad x^{\log_x 20 - \log_x 4}$$

$$= x^{\log_x \left(\frac{20}{4}\right)}$$

$$= x^{\log_x 5}$$

$$\boxed{= 5}$$

$$\text{or} \quad x^{\log_x 5} = y$$

$$\log(x^{\log_x 5}) = \log y$$

$$\log_x 5 \cdot \log x = \log y$$

$$\log_x 5 = \log_x y$$

$$y = 5$$

$$9. \quad \frac{2}{3} \log x + 3 \log y - \frac{1}{3} \log z$$

$$= \log x^{\frac{2}{3}} + \log y^3 - \log z^{\frac{1}{3}}$$

$$= \log \sqrt[3]{x^2} + \log y^3 - \log \sqrt[3]{z}$$

$$\boxed{= \log \left(\frac{\sqrt[3]{x^2} \cdot y^3}{\sqrt[3]{z}} \right)}$$

$$10. \quad \log x = p \quad \log y = q$$

$$\log \left(\frac{(\sqrt[3]{x})^2}{y^7} \right)$$

$$= \log (\sqrt[3]{x})^2 - \log y^7$$

$$= \log x^{\frac{2}{3}} - \log y^7$$

$$= \frac{2}{3} \log x - 7 \log y$$

$$\boxed{= \frac{2}{3} p - 7 q}$$

$$\boxed{= \frac{2p}{3} - 7q}$$

$$11. \log_2(x-3) + \log_2(x+5) = 3$$

$$\log_2(x^2+2x-15) = 3$$

$$\frac{\log x^2+2x-15}{\log 2} = 3$$

$$\log x^2+2x-15 = 3 \log 2$$

$$\log x^2+2x-15 - 3 \log 2 = 0$$

$$\log x^2+2x-15 - \log 8 = 0$$

$$\log \left(\frac{x^2+2x-15}{8} \right) = 0$$

$$\frac{x^2+2x-15}{8} = 1$$

$$x^2+2x-15 = 8$$

$$x^2+2x-23 = 0$$

$$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$$

$$x = \frac{-2 \pm \sqrt{4+92}}{2}$$

$$x = \frac{-2 \pm \sqrt{96}}{2}$$

$$x = \frac{-2 \pm 4\sqrt{6}}{2} = -1 \pm 2\sqrt{6}$$

$$\boxed{-1 + 2\sqrt{6}}$$

→ 3.9

→ ~~-5.9~~

$$12. \log_2(3-2x) - \log_2(2-x) = \log_2 3$$

$$\log_2\left(\frac{3-2x}{2-x}\right) = \log_2 3$$

$$\frac{3-2x}{2-x} = 3$$

$$3-2x = 9-6x$$

$$4x = 6$$

$$x = \frac{3}{2}$$

$\log_2 0$ is undefined!

NO SOLUTION