Ch 6 Review #2 Name: Key

Algebra 2b **No calculator portion** Period: ______ Date: ___________

1. Create a table for $f(x) = 3(2)^{x+1} - 4$ and provide a **<u>COMPLETE</u>** graph, then provide answers for key function attributes. (Remember this means label asymptotes, key points with coordinates, put arrows on curves if domain continues in that direction! Lots of points are lost without these things!!!!)

x	-2	-1	0	1	2	3
$f(x)$		-1	2	8	20	44

Domain: $\mathbb{R}$ (Don't write $x = \mathbb{R}$)

Range: $y > -4$ (Don't write $-4 < y < \mathbb{R}$) It is → $-4 < y < \infty$ is good)

Asymptotes: $y = -4$

Key Points: $(0, 2)$

x-int:

$0 = 3(2)^{x+1} - 4$

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

$\frac{4}{3} = 2^{x+1}$

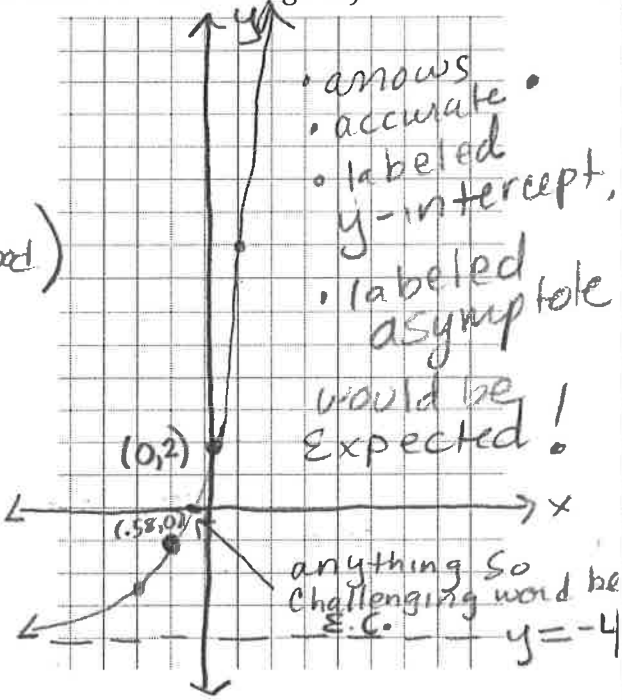
$\log(\frac{4}{3}) = (x+1)\log 2$

$\frac{\log(\frac{4}{3}) - \log 2}{\log 2} = x$

$x \approx -.58$

Symmetry: no symmetry

Increasing/Decreasing/Neither:



2. Consider the function $f(x) = (2x - 3)^2 - 1$.

a. What are the domain and range of $f(x)$?

D: $\mathbb{R}$

R: $y \geq -1$

b. If $g(x) = x - 1$, what is $f(g(x))$?

$f(g(x)) = (2(x-1)-3)^2 - 1$

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

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

c. What are the domain and range of $f(g(x))$?

D: $\mathbb{R}$

R: $y \geq -1$

d. Is $f(g(x)) = g(f(x))$? Justify why or why not.

$g(f(x)) = (2x-3)^2 - 1 - 1$

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

not same as $f(g(x))$

3. Explain why $10^{\log 4} = 4$. (Do not use the word CANCEL in your explanation!)

Let $10^{?} = 4$, then changing to logarithm form

$\log 4 = ?$ and we see that the exponent would need to be $\log 4$.

$10^{?} = 4$

10^x and $\log x$ are inverses, they undo each other.

$y = 10^x$ inverses

$x = 10^y$ or $y = \log x$

So $x = 10^{\log x}$

$x = x$

1. Solve the following system of 3 variables (show algebraic work):

$$\begin{cases} x - y + z = -4 \\ 2x + y + z = 3 \\ -2x + y + z = -1 \end{cases}$$

$-1(x + 2y = 7)$

$-3x + 2y = 3$

$-4x = -4$

$\boxed{x = 1}$

$1 + 2y = 7$

$\boxed{y = 3}$

$1 - 3 + z = -4$

$-2 + z = -4$

$\boxed{z = -2}$

Check: $1 - 3 - 2 = -4$

$1 - 5 = -4$

$-4 = -4$

$2(1) + 3 - 2 = 3$

$2 + 3 - 2 = 3$

$3 = 3$

$-2(1) + 3 - 2 = -1$

$-2 + 3 - 2 = -1$

$-4 + 3 = -1$

$-1 = 1$

write as coordinates!

Solution: $(1, 3, -2)$

2. What is the equation of the parabola that passes through $(-2, 25)$, $(1, -2)$, and $(3, 10)$? (Show algebraic work.)

$4a - 2b + c = 25$

$a + b + c = -2$

$9a + 3b + c = 10$

$-a - b - c = 2$

$2(3a - 3b = 27)$

$3(8a + 2b = 12)$

$6a - 6b = 54$

$24a + 6b = 36$

$30a = 90$

$\boxed{a = 3}$

$3(3) - 3b = 27$

$9 - 3b = 27$

$\frac{-3b}{-3} = \frac{18}{-3}$

$\boxed{b = -6}$

$3 - 6 + c = -2$

$-3 + c = -2$

$\boxed{c = 1}$

Equation: $y = 3x^2 - 6x + 1$

(checked on grapher)

3a. Find the inverse of $f(x) = 3\sqrt{x-1} + 6$

$f^{-1}(x) = \left(\frac{x-6}{3}\right)^2 + 1$

b. What is the domain and range of $f^{-1}(x)$?

D: $x \geq 6$

R: $y \geq 1$

c. Explain why the domain is not $\mathbb{R}$.

Because the domain and Range are switched from $f(x)$ for $f^{-1}(x)$.

4. Simplify the algebraic expression and state any limitations on x.

$$\frac{x^2 - 2x - 3}{x^2 - x - 6} - \frac{x^2 + x - 6}{x^2 + 5x + 6}$$

$$\frac{\cancel{(x-3)}(x+1)}{\cancel{(x-3)}(x+2)} - \frac{(x-2)\cancel{(x+3)}}{\cancel{(x+3)}(x+2)}$$

$$\frac{x + 1 - x + 2}{x + 2}$$

$$\boxed{\frac{3}{x+2}}$$

$x \neq 3$

$x \neq -3$

$x \neq -2$

5. Given $f(x) = (x+4)^2 - 2$ and $g(x) = \sqrt{x+2} - 4$

Decide if these functions are inverses. Defend your conclusion.

$f(g(x)) = (\sqrt{x+2} - 4 + 4)^2 - 2$

$= (\sqrt{x+2})^2 - 2$

$= x + 2 - 2$

$= x$

yes $f(x)$ and $g(x)$ are inverse $f(g(x)) = x$.

6. Solve for x in the following equations:

a. $\log_9 3 = x$

$9^x = 3$

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

b. $2^x + 1 = 3^2$

$2^x = 9 - 1$

$2^x = 8$

$\boxed{x = 3}$

c. $\log_7 1 = x$

$7^x = 1$

$\boxed{x = 0}$

d. $\log_x\left(\frac{1}{81}\right) = 4$

$x^4 = \frac{1}{81}$

$\boxed{x = \frac{1}{3}}$

e. $\sqrt[3]{(x-1)^3} = \sqrt[3]{125}$

$x - 1 = 5$

$\boxed{x = 6}$

f. $40 = 5(2)^{x+1}$

$8 = 2^{x+1}$

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

$3 = x + 1$

$\boxed{x = 2}$