20.) $\log_4 4^{5-x} = \log_4 9^{3x+2}$

$$5 - x = (3x+2)\log_4 9$$

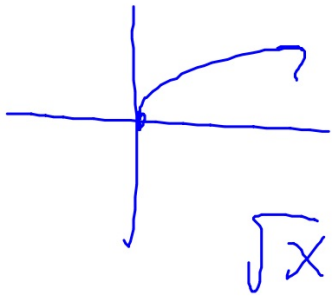
$$5 - x = 3x\log_4 9 + 2\log_4 9$$

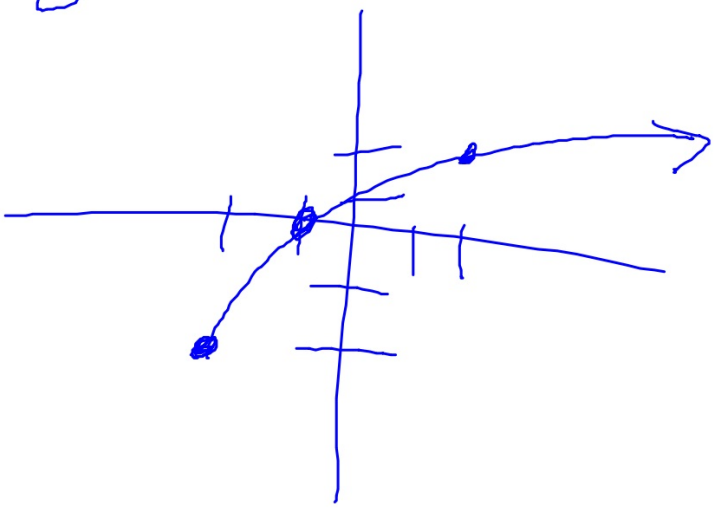
$$5 - 2\log_4 9 = x(3\log_4 9 + 1)$$

$$\frac{5 - 2\log_4 9}{3\log_4 9 + 1} = x$$

Ch 3

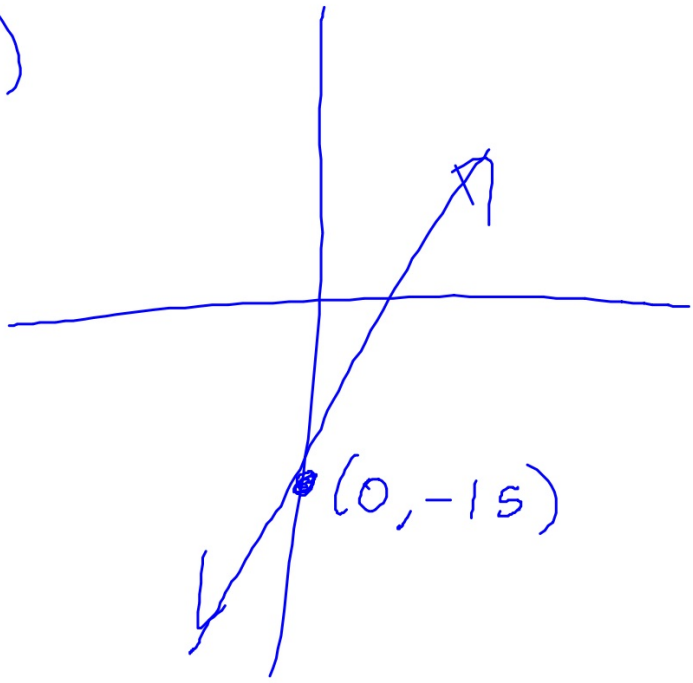
19.) $y = 2\sqrt{x+2} - 2$





x	y
-2	-2
-1	0
2	2

9.)



$f^{-1}(-15, 0)$

(c) $y = \frac{1}{5}x + 1$

$f^{-1}(x)$

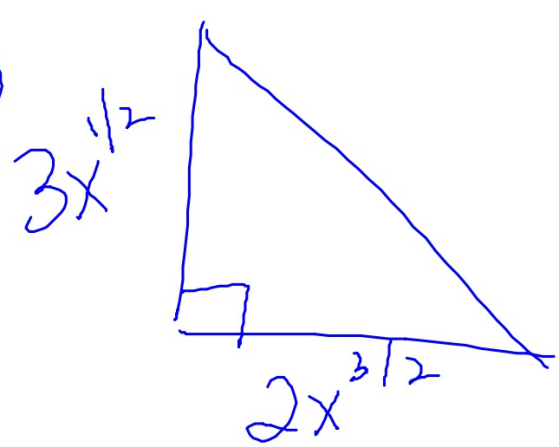
$$y = \frac{-8}{27} t^3$$

$$t = \frac{-8}{27} y^3$$

$$\sqrt[3]{\frac{-27}{8} t} = y^3$$

$$\frac{-3}{2} \sqrt[3]{t}$$

4.)



$$\left(3x^{1/2}\right)^2 + \left(2x^{3/2}\right)^2 = c^2$$

$$\sqrt{9x + 4x^3} = \sqrt{c^2}$$

C

$$(x+1)^{-1} = \frac{1}{(x+1)^1}$$

b.)

-1	3	0	-4	0	2	-5
		-3	3	1	-1	-1
	3	-3	-1	1	1	-6

$$\frac{-6}{x+1}$$

1d.) $\cancel{3000} = \cancel{1000}\left(1 + \frac{.045}{12}\right)^{12t}$

2400 800

$$3 = \left(1 + \frac{.045}{12}\right)^{12t}$$

$$\log 3 = \log(1.00375)^{12t}$$

$$\log 3 = 12t \cdot \log 1.00375$$

$$\frac{\log 3}{(12 \cdot \log 1.00375)} = t = 24.459$$

20c) $e^{\ln((3n-5)n)} = e^{\ln(14+2n^2)}$

$$3n^2 - 5n = 14 + 2n^2$$

$$n^2 - 5n - 14 = 0$$

$$(n-7)(n+2) = 0$$

$$n = 7, \cancel{n = -2}$$

7.)

Bank A

$$A = Pe^{rt}$$

$$A = 8000e^{(.03)(25)}$$

Bank

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

$$A = 8000\left(1 + \frac{.045}{4}\right)^{100}$$

$$\underbrace{\log_{10} 6 + \log_{10} x^2 - \log_{10} 2x}_{} = 1$$

$$\log_{10}\left(\frac{6x^2}{2x}\right) = 1$$

$$10^{\log_{10}\left(\frac{3x}{1}\right)} = 10^1$$

$$3x = 10 \; ; \; x = \frac{10}{3}$$

Ch 4 Review

ex: Expand. Simplify if possible.

$$\log_9\left(\frac{x^2+1}{81y^2z^3}\right)^4$$

$4 \cdot \log_9 81$

$4\log_9(x^2+1) - 8 - 8\log_9 y - 12\log_9 z$

ex: Mara receives a 10% raise each year for 3 consecutive years. What was her starting salary if she currently makes $54,000.

$$54000 = P\left(1 + \frac{.10}{1}\right)^3$$

$$\$40571.00 = P$$

The domain of the function $f(x)=\log_4(5x+3)-2$ over the set of real numbers is

(A) $(-1.4,\infty)$ (B) $(-0.6,\infty)$ (C) $(-\infty,\infty)$ (D) $(-2.6,\infty)$ (E) $\left(-1\frac{2}{3},\infty\right)$

$5x+3>0$

$x>\frac{-3}{5}$

ex: Solve.

$$125^x = \frac{5}{25^{x-2}}$$

$5 \cdot (25^{-1})^{x-2}$

$25^{x-2} \cdot 125^x = 5$

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

$3x = 1 - 2x + 4$

$1 = x$

mult.

If $\frac{1}{25}$ of 5^{20} is 125^x, then the value of x is

=

(A) -3 (B) 5^3 (C) -5 (D) 6 (E) 2^3

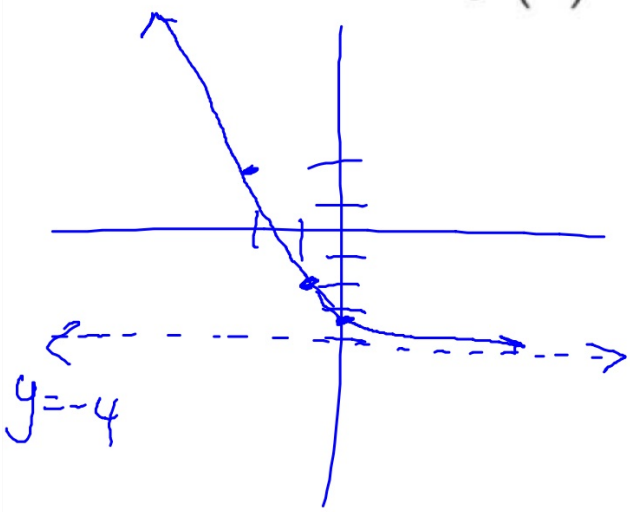
$5^{18} = 5^{3x}$

ex: Sketch. State the domain and range in interval notation.

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

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

R: $(-4, \infty)$



x	y
0	$\frac{2}{3} - 4 = -3\frac{1}{3}$
-1	-2
-2	2

ex: Solve.

$$\log_9(x+2)+\log_9(x-2)=\log_9(3x-10)$$

$$\log_9(x^2-4)=\log_9(3x-10)$$

$$x^2-4=3x-10$$

$$x^2-3x+6=0$$

$\emptyset$

ex: Evaluate.

$$\boxed{\log_a b = \frac{\log b}{\log a} = \frac{\ln b}{\ln a}}$$

$$\frac{\ln 5}{\ln 25}$$

$$\log_{25} 5$$

$$1/2$$

ex: Solve. Round to three decimal places.

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

$$\boxed{-4.419}$$

Which of the following functions is exponential?

(A) $f(x)=b^2$ (B) $f(x)=x^3$ (C) $f(x)=x^{2/3}$ (D) $f(x)=\sqrt[3]{x}$ (E) $f(x)=8^x$

$y=a\cdot b^x$

ex: Evaluate.

$$\log_{64}\left(\frac{1}{16}\right)$$

$$64^x = 2^{-4}$$

$$2^{6x} = 2^{-4}$$

$$x = -2/3$$

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

$\ln x^5 =$

(A) $\dfrac{5\log_7 x}{\log_7 e}$ (B) $\dfrac{2\log x^3}{\log e}$ (C) $\dfrac{x\log_{1/2} 5}{\log_{1/2} e}$ (D) $3\ln x^2$ (E) $\ln x^2 \cdot \ln x^3$

$5\log_e x$

$5\ln x$

$\log_a b = \dfrac{\log b}{\log a}$

ex: If

$$x = \log_2 3 \qquad y = \log_2 5$$

Rewrite the expression in terms of x and y.

$$\log_2 0.9$$

$$\log_2 \frac{9}{10} = \log_2 9 - \log_2 10$$

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

$$2x - y - 1$$

What is the percent growth rate of $M(t) = 1.25 \cdot 1.049^t$

(A) 49% (B) 23% (C) 4.9% (D) 2.3% (E) 1.23%

$2^{-1}\cdot(-3\ln 2-1)=$

(A) $-\frac{1}{2}\ln(8e)$ (B) $-\ln(8e)$ (C) $-\frac{3}{2}\ln 2$ (D) $-\frac{1}{2}$ (E) $\frac{1}{8}$

ex: Find the x and y intercepts, if possible.

$$f(x) = 3\log_5 x - 6$$

x-int	y-int
$y = 0$	$x = 0$
$x = 25$	X
$(25, 0)$	

$0 = 3\log_5 x - 6$

$2 = \log_5 x$

$5^2 = 5^{\log_5 x}$

$25 = x$

$\log_9 64 =$

(A) $5\log_3 2$ (B) $(\log_3 8)^2$ (C) $\dfrac{\ln 64}{\ln 9}$ (D) $2\log_9 32$ (E) $\dfrac{\log 64}{9}$

$\log 12 =$

(A) $3\log 4$ (B) $\log 3 + \log 4$ (C) $4\log 3$ (D) $\log 3 \cdot \log 4$ (E) $2\log 6$

Which of the following is the inverse of $f(x)=2\cdot 3^x$?

(A) $f^{-1}(x)=\log_3\left(\frac{x}{2}\right)$ (B) $f^{-1}(x)=\log_3\left(\frac{x}{3}\right)$ (C) $f^{-1}(x)=2\log_3 x$

(D) $f^{-1}(x)=3\log_2 x$ (E) $f^{-1}(x)=0.5\log_3 x$

$f(x)=2\cdot 3^x$

ex: Condense. Simplify if possible.

$$\ln\left(x^2-4\right)-\ln\left(x+2\right)-3\ln y$$

$$\ln\left(\frac{x-2}{y^3}\right)$$

What point do all functions of the form $f(x)=b^x$ have in common?

(A) $(1,1)$ (B) $(1,0)$ (C) $(0,1)$ (D) $(0,0)$ (E) $(-1,-1)$

ex: Solve.

$$3 \cdot 8^{2x} - 31 \cdot 8^{x} - 16 = 0$$

let $a = 8^x$

$3a^2 - 31a - 16 = 0$

ex: Evaluate.

$$7^{\log_7 15 - \log_7 5}$$

$$7^{\log_7 3}$$

$$3$$

ex: Solve. Round to three decimal places.

$$3 \cdot 5^{x-2} + 4 = 5$$

$$\log_5 5^{x-2} = \frac{1}{\log_5 3}$$

$$x \cancel{-2} = \left(\log_5 \frac{1}{3}\right) + 2$$

$$x = 1.317$$

ex: Sketch. State the domain and range in interval notation.

$$f(x) = 5 - 3\log_2(x-4)$$

 ex: Jack invests $10,000 in an account for 4 years and currently has $12,345. If the interest is compounded continuously what interst rate was used? Round to three decimal places.

If $3^{x+y} = 9$ and $3^{x-y} = 9$ then xy equals

(A) 6 (B) 0 (C) 5 (D) 7.2 (E) 1