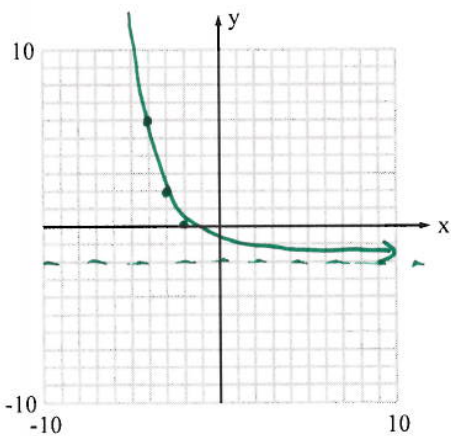


Part 1 - No Calculator

Graph the function. Show the transformation of 3 points. State the domain and range. Be sure to draw in any asymptotes.

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

Parent	Stretch & Shift
(0, 4)	(-3, 2)
(1, 2)	(-2, 0)
(-1, 8)	(-4, 6)

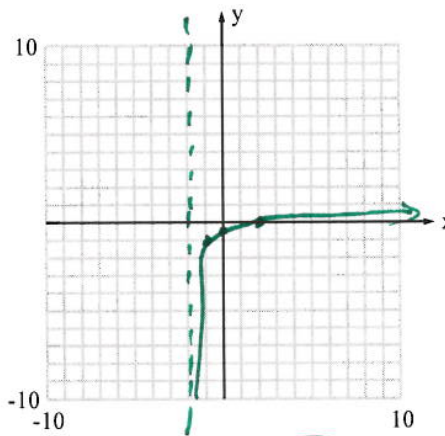


D:  $\mathbb{R}$  R:  $y > -2$

2.  $y = \log_4(x+2) - 1$  left 2 down 1  
 $4^y = x$

Parent	Stretch & Shift
(1, 0)	(-1, -1)
(4, 1)	(2, 0)
(2, 1/2)	(0, -1/2)

climb to right



D:  $x > -2$  R:  $\mathbb{R}$

Simplify each expression.

3.  $\frac{5e^2(-2e^{-7})}{4e^3} = \frac{5 \cdot -2 e^2}{4e^3 \cdot e^7} = \frac{-10e^2}{4e^{10}}$

either  $-\frac{5}{2}e^{-8} = \frac{-5}{2e^8}$

4.  $(5e^{4x})^{-3} = 5^{-3}e^{-12x} = \frac{1}{125}e^{-12x}$   
or  $\frac{1}{125e^{12x}}$

Write each equation in exponential form.

5.  $\log_5 10 = x$   
 $5^x = 10$

6.  $\ln x = 12$   
 $e^{12} = x$

Evaluate each logarithm.

7.  $\log_4 64 = x$   
 $4^x = 64$   
 $4^x = 4^3$   
 $x = 3$

8.  $\log_3\left(\frac{1}{81}\right) = x$   
 $3^x = \frac{1}{81}$   
 $3^x = 3^{-4}$   
 $x = -4$

9. Condense into a single logarithm. Then simplify fully.

$$5 \log_4 2 + 3 \log_4 x - 2 \log_4 3 - \log_4 y$$

$$\frac{\log_4 2^5 + \log_4 x^3 - \log_4 3^2 - \log_4 y}{\log_4 32x^3 - \log_4 9} \rightarrow \log_4 \frac{32x^3}{9} - \log_4 y$$

$$= \log_4 \frac{32x^3}{9y}$$

10. Expand the logarithm and simplify.

$$\log_3 \left( \frac{27x}{10^4 \sqrt[4]{y}} \right)$$

$$\log_3 27x - \log_3 10^4 \sqrt[4]{y}$$

$$\log_3 27 + \log_3 x - (\log_3 10 + \log_3 y^{1/4})$$

$$\log_3 27 + \log_3 x - \log_3 10 - \log_3 y^{1/4}$$

either

Solve each equation. Show work. Check for extraneous answers.

11.  $8^{x+2} = 16^{2x+9}$

$$2^{3(x+2)} = 2^{4(2x+9)}$$

$$3x+6 = 8x+36$$

$$3x = 8x+30$$

$$-5x = 30$$

$$x = -6$$

12.  $\log_6(4x-3) = \log_6(9+2x)$

$$4x-3 = 9+2x$$

$$2x-3 = 9$$

$$2x = 12$$

$$x = 6$$

Given:  $\log_7 3 = a$  and  $\log_7 8 = b$ . Evaluate the following logs in terms of  $a$  &  $b$ .

13.  $\log_7 \left( \frac{64}{9} \right)$

$$\log_7 64 - \log_7 9$$

$$\log_7 8^2 - \log_7 3^2$$

$$2 \log_7 8 - 2 \log_7 3$$

$$2b - 2a$$

14.  $\log_7 72$

$$\log_7 8 \cdot 9$$

$$\log_7 8 + \log_7 9$$

$$\log_7 8 + \log_7 3^2$$

$$\log_7 8 + 2 \log_7 3$$

$$b + 2a$$

Part 2 - Calculator allowed

decay  $y = a(1-r)^t$

1. You bought a new motorcycle for \$14,000 in 2012. The value decreases by 18% each year.

a) Write a model that gives the motorcycle's value after  $t$  years.  $y = 14,000(.82)^t$

b) Find the value of the car in 2016. Round to the nearest dollar.  $t = 4$  \$6329.70

c) Find the year when the value of the car will be less than \$5000. year 6

calc. use trace or table

2. You deposit \$5,500 in an account that pays 1.75%. How much money will be in the account after 10 years based on how often the money is compounded? SHOW SET UP.

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

Set-up:  $5500(1 + \frac{.0175}{12})^{12 \cdot 10}$

a) \$6551.02

$A = Pe^{rt}$  b) continuously

Set-up:  $5500e^{.0175 \cdot 10}$

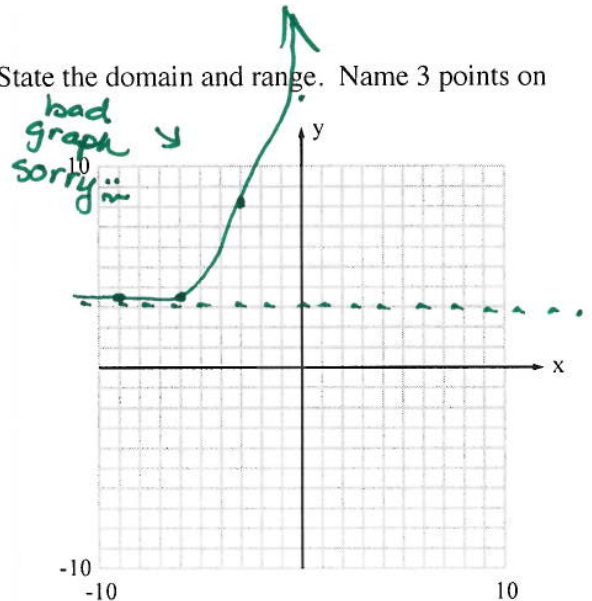
b) \$6551.85

3. Draw the graph of  $y = 2e^{x+4} + 3$  including the asymptote. State the domain and range. Name 3 points on your graph. Any rounded values should be to 3 places.

Domain:  $\mathbb{R}$

Range:  $y > 3$

x	y
-9	3.014
-6	3.271
-3	8.437
0	112.2



4. The number of salmon (in thousands) in Lake Michigan can be modeled by  $P = 242e^{1.4t}$  where  $t$  is the number of years since 2007. How many salmon will likely be in Lake Michigan in 2018?

$P = 242e^{1.4(11)}$   $t = 11$

1,180,185,806,000  
Now!!

5. You deposit \$4250 in an account that pays 2.25% annual interest. How long does it take the balance reach \$5000 when the interest is compounded quarterly? Show work.

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

$$A = 4250\left(1 + \frac{.0225}{4}\right)^{4t}$$

← on calc. used table

8 years

Solve each equation. Check for extraneous solutions. Round the result to three decimal places if necessary. Show all work.

6.  $6^{4x-3} = 11$

$$\log 6^{4x-3} = \log 11$$

$$4x-3 \log 6 = \log 11$$

$$4x-3 = \frac{\log 11}{\log 6}$$

$$4x-3 = 1.338$$

$x \approx 1.085$

7.  $3e^{x+4} - 7 = 8$

$$e^{x+4} = 5$$

$$\ln e^{x+4} = \ln 5$$

$$x+4 \ln e = \ln 5$$

$$x = \ln 5 - 4$$

$x = -2.391$

8.  $4\log_3(x-8) = 16$

$$\log_3(x-8) = 4$$

$$3^4 = x-8$$

$$81 = x-8$$

$x = 89$

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

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

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

$$0 = x^2 - 2x - 8$$

$$0 = (x-4)(x+2)$$

$x = 4$   ~~$x = -2$~~  extraneous

$$\log_2 4 + \log_2(2) = 3$$

$$\log_2 8 = 3 \checkmark$$