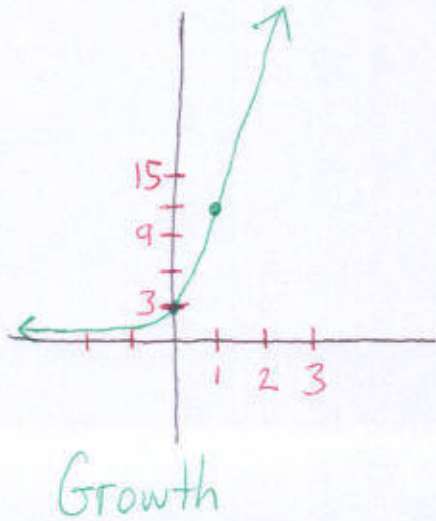
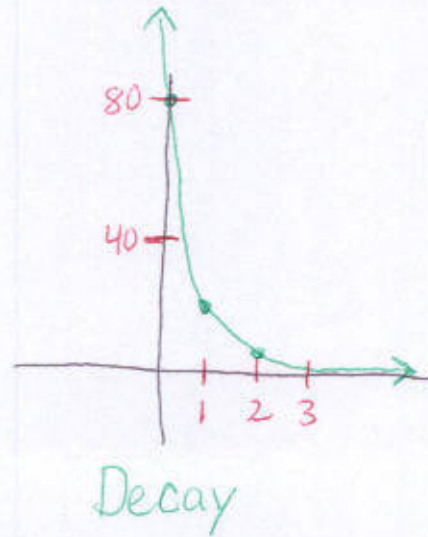


1) Sketch:  $f(x) = 3(4)^x$



2) Sketch:  $y = 80\left(\frac{1}{4}\right)^x$



Determine if they are Exponential Growth or Decay:

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

Decay

4)  $y = 1.9^x$

Growth

5)  $y = 0.3(.5)^x$

Decay

6) You own a \$200,000 home and it is increasing in value at about 3% each year.

a) Write the function.  $A = 200,000(1.03)^t$

b) Write an equation for how much it will be worth in 8 years?

$$A = 200,000(1.03)^8$$

7) Monsters presently cost \$2. Deflation decreases the cost of things by about 5% each year.

a) Write the function.  $A = 2(1-0.05)^t = 2(.95)^t$

b) Write an equation for how much it will cost in 20 years?

$$A = 2(.95)^{20}$$

1) Write as a log:

a)  $4^2 = 16$

$$\log_4 16 = 2$$

b)  $\frac{1}{125} = 5^{-3}$

$$5^{-3} = \frac{1}{125}$$

$$\log_5 \frac{1}{125} = -3$$

2) Write as an exp:

a)  $\log_6 36 = 2$

$$6^2 = 36$$

b)  $\log_{10} 0.01 = -2$

$$10^{-2} = .01$$

3) Solve:

a)  $\log_4 64$

$$\log_4 64 = X$$

$$4^X = 64$$

$$X = \boxed{3}$$

b)  $\log_7 \left( \frac{1}{49} \right)$

$$\log_7 \frac{1}{49} = X$$

$$7^X = \frac{1}{49}$$

$$7^X = 49^{-1}$$

$$7^X = (7^2)^{-1}$$

$$7^X = 7^{-2}$$

$$X = \boxed{-2}$$

c)  $\log 1000$

$$\log_{10} 1000 = X$$

$$10^X = 1000$$

$$X = \boxed{3}$$

1) Condense:

a)  $3 \log x - \log 5 - 2 \log y$

$$\log x^3 - \log 5 - \log y^2$$

$$\log \left( \frac{x^3}{5y^2} \right)$$

b)  $4 \log y + \frac{1}{3}(\log 8 + \log 27)$

$$\log y^4 + \log 8^{1/3} + \log 27^{1/3}$$

$$\log y^4 + \log (2^3)^{1/3} + \log (3^3)^{1/3}$$

$$\log y^4 + \log 2 + \log 3$$

$$\log y^4 + \log (2 \cdot 3)$$

$$\log (6y^4)$$

2) Expand:

a)  $\log_6 \left( \frac{36y}{x^6} \right)$

$$\log_6 36 + \log_6 y - \log_6 x^6$$

$$2 + \log_6 y - 6 \log_6 x$$

b)  $\log_4 2(6x)^2$

$$\log_4 2 + 2(\log_4 6x)$$

$$\frac{1}{2} + 2(\log_4 6 + \log_4 x)$$

$$\frac{1}{2} + 2 \log_4 6 + 2 \log_4 x$$

3) Evaluate:  $3\log_3 9 - \log_5 125$

$$3(2) - 3$$

$$6 - 3 = \boxed{3}$$

$$3^x = 9$$
$$x = 2$$

$$5^x = 125$$
$$x = 3$$

4) Given:  $\log 5 \approx 0.7$  and  $\log 6 \approx 0.8$

Find:  $\log\left(\frac{36}{5}\right)$

$$\log\left(\frac{6^2}{5}\right) = 2\log 6 - \log 5$$

$$2(0.8) - (0.7)$$

$$1.6 - 0.7 = \boxed{0.9}$$

$$1) 22 - 3(5)^{1-2x} = 1$$

$$\begin{array}{r} -22 \qquad -22 \\ \hline -3(5)^{1-2x} = -21 \\ \hline -3 \qquad -3 \end{array}$$

$$5^{1-2x} = 7$$

$$\log_5 7 = 1-2x$$

$$\begin{array}{r} \log 7 \\ \hline \log 5 \end{array} = \begin{array}{r} 1-2x \\ \hline -1 \end{array}$$

$$\begin{array}{r} \log 7 \\ \hline \log 5 \end{array} - 1 = \begin{array}{r} -2x \\ \hline -2 \end{array}$$

$$x = \frac{\frac{\log 7}{\log 5} - 1}{-2}$$

$$2) 125^{x+7} = 25^{4x-2}$$

$$(5^3)^{x+7} = (5^2)^{4x-2}$$

$$5^{3x+21} = 5^{8x-4}$$

$$\begin{array}{r} 3x+21 = 8x-4 \\ -8x \qquad -8x \end{array}$$

$$\begin{array}{r} -5x+21 = -4 \\ -21 \qquad -21 \end{array}$$

$$\begin{array}{r} -5x = -25 \\ \hline -5 \qquad -5 \end{array}$$

$$x = 5$$

$$3) 3\log_2(3+4x)+1=19$$

~~-1~~   ~~-1~~

$$\frac{3\log_2(3+4x)=18}{3}$$

$$\log_2(3+4x)=6$$

$$2^6 = 3+4x$$

$$64 = 3+4x$$

~~-3~~   ~~-3~~

$$\frac{61}{4} = \frac{4x}{4}$$

$$x = \frac{61}{4}$$

$$4) \log(x-3) + \log x = 1$$

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

$$\log_{10}(x^2-3x) = 1$$

$$10^1 = x^2 - 3x$$

~~-10~~   ~~-10~~

$$0 = x^2 - 3x - 10$$

~~-10~~  
~~-5~~   ~~2~~  
~~3~~

$$0 = (x-5)(x+2)$$

$$x-5=0$$

~~+5~~   ~~+5~~

$$x=5$$

$$x+2=0$$

~~-2~~   ~~-2~~

$$x=2$$

Extraneous  
Solution

1) Condense:  $2 \ln 7 + 3 \ln x - \frac{1}{3} \ln y$

$$\ln 7^2 + \ln x^3 - \ln y^{\frac{1}{3}}$$

$$\ln \left( \frac{49x^3}{\sqrt[3]{y}} \right)$$

2) Simplify:  $32 - 4 \ln e^2$

$$32 - 4(2 \ln e)$$

$$32 - 4(2(1))$$

$$32 - 8$$

$$\boxed{24}$$

Solve:

$$3) 2 + \ln \sqrt{3n-2} = 5$$

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

$$2 \left( \frac{1}{2} \ln(3n-2) \right) = (3)2$$

$$\log_e(3n-2) = 6$$

$$e^6 = 3n-2$$

$$\frac{e^6+2}{3} = \frac{3n}{3}$$

$$n = \frac{e^6+2}{3}$$

$$4) 3e^{1-5x} + 1 = 7$$

$$3e^{1-5x} = 6$$

$$e^{1-5x} = 2$$

$$\log_e 2 = \frac{1-5x}{+1}$$

$$\frac{-1 + \ln 2}{-5} = \frac{-5x}{-5}$$

$$x = \frac{-1 + \ln 2}{-5}$$

$$5) \ln(x+1) - \ln 3x = 0$$

$$\log_e \left( \frac{x+1}{3x} \right) = 0$$

$$e^0 = \frac{x+1}{3x}$$

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

$$3x = x+1$$

$$2x = 1$$

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

6) You put \$1000 in a bank account and it will be worth \$3000 in 12 years. What type of interest rate are you getting if interest is compounded continuously?

$$\frac{3000}{1000} = \frac{1000e^{r(12)}}{1000}$$

$$3 = e^{12r}$$

$$e^{12r} = 3$$

$$\log_e 3 = 12r$$

$$\frac{\ln 3}{12} = \frac{12r}{12}$$

$$r = \frac{\ln 3}{12}$$