

8.-1: Graphing Exponential Functions (477)
Exponential Decay

Ex#4a) $y = \left(\frac{1}{3}\right)^x$ $f(x) = b^x$ $\left(1, \frac{1}{b}\right)$

$f(x) = ab^{x-h} + k$

$\left(\frac{1}{3}\right)^{-1} = \frac{1}{\frac{1}{3}} = 3$

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

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

4B) $y = \frac{3}{8}\left(\frac{5}{6}\right)^{x-1} + 1$

Ex# 5 Decay $A(t) = a(1-r)^t$

$y = 35(1-.125)^t$
 $y = 35(.875)^t$

b) $y = 35(.875)^3 \approx 23.45$

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

$D = x = \text{all Real}$
 $R = y > 3$

Pa 479
 1. $f(x) = 2^x + 0$
 $D = \text{all Real}$
 $R = y > 0$

The page contains several hand-drawn graphs on lined paper. At the top, there's a graph of $f(x) = b^x$ showing exponential decay for $0 < b < 1$. It passes through $(1, 1)$ and $(0, 1/b)$. Below this is a graph of $y = (1/3)^x$ with points $(-1, 3)$ and $(1, 1/3)$ marked. To the right is a graph of $y = 2(1/4)^{x+2} - 3$ with a horizontal asymptote at $y = -3$. Below that is a graph of $y = -3(2/3)^{x-4} + 2$ with a horizontal asymptote at $y = 2$. To the right of that is a graph of $y = 35(.875)^t$ with a horizontal asymptote at $y = 0$. Below that is a graph of $y = 35(.875)^3 \approx 23.45$. At the bottom left is a graph of $f(x) = 2^x + 0$ with a horizontal asymptote at $y = 0$. At the bottom right is a graph of $f(x) = (1/2)^{x+1} + 3$ with a horizontal asymptote at $y = 3$. Various annotations include 'frac.', 'comp. exp.', 'decay', 'expand', and 'growth'.

8-1: Graphing Exponential Functions (477)

Exponential Decay

EX#4a) $y = (\frac{1}{3})^x$

0	1
1	1/3
-1	

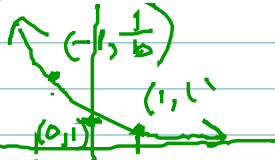
$(\frac{1}{3})^{-1} = \frac{1}{\frac{1}{3}} = 3$

$1 \div \frac{1}{3} = 3$

$1 \cdot \frac{3}{1} = 3$

$f(x) = b^x$

frac. $0 < b < 1$

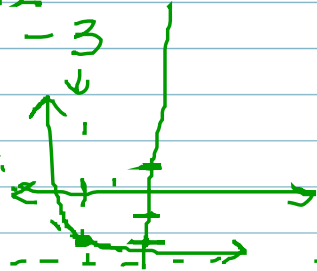


at $a > 1$ comp. growth
at $a < 1$ exp. decay

$f(x) = ab^{x-h} + k$

Ex 4b) $y = 2(\frac{1}{4})^{x+2} - 3$

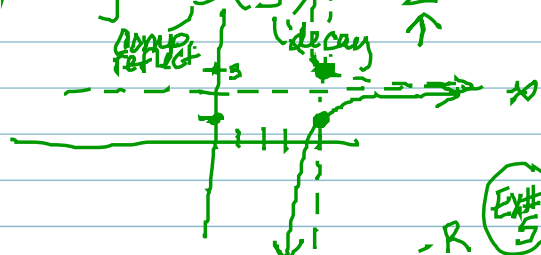
R comp. decay



4A) $y = -3(\frac{2}{5})^{x-4} + 2$

comp. reflect

decay



Ex#5) Decay $A(t) = a(1-r)^t$

$y = 35(1-.125)^t$

$y = 35(.875)^t$

cont. decay



4B) $y = \frac{3}{8}(\frac{5}{6})^{x-1} + 1$

expand

decay



b) $y = 35(.875)^3$

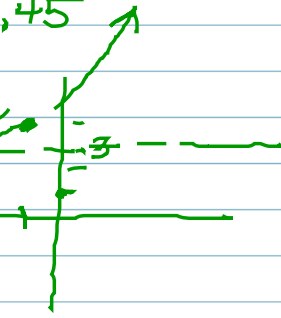
≈ 23.45

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

growth

D: $x = \text{all Real}$

R: $y > 3$



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1, $f(x) = 2^x + 0$

D: all Real

R: $y > 0$