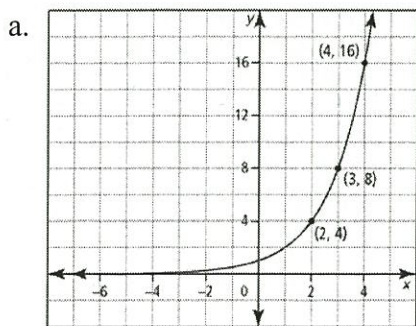


Assignment 1: Characteristics of Exponential Functions and Solving Exponential Functions

1. Fill in the following chart:

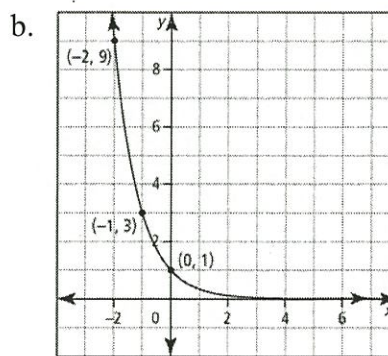
	$y = 2^x$	$y = 5(3)^x$	$y = \left(\frac{3}{4}\right)^x$
Domain	$x \in \mathbb{R}$	$x \in \mathbb{R}$	$x \in \mathbb{R}$
Range	$y > 0$	$y > 0$	$y > 0$
x-intercept	none	none	none
y-intercept	(0, 1)	(0, 5)	(0, 1)
Equation of Asymptote	$y = 0$	$y = 0$	$y = 0$
Increasing or Decreasing?	increasing	increasing	decreasing.

2. Determine the equation for each graph:



$y = a \cdot b^x$
 $y = 1 \cdot b^x$

$y = b^x$
 $\sqrt{4} = \sqrt{b^2}$
 $b = 2$
 $y = 2^x$



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

3. Algebraically solve each of the following equations:

a. $2^{x+1} = 4^{x-2}$

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

$$\begin{array}{r} x+1 = 2x-4 \\ -x \quad -x \end{array}$$

$$\begin{array}{r} 1 = x-4 \\ +4 \quad +4 \end{array}$$

$$\boxed{x=5}$$

c. $3^{x+2} = 27^x$

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

$$\begin{array}{r} x+2 = 3x \\ -x \quad -x \end{array}$$

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

$$\boxed{x=1}$$

e. $16^{4x} = 64^{x-1}$

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

$$\begin{array}{r} 8x = 3x-3 \\ -3x \quad -3x \end{array}$$

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

$$\boxed{x = -3/5}$$

b. $4^{2x-1} = 64$

$$4^{2x-1} = 4^3$$

$$\begin{array}{r} 2x-1 = 3 \\ +1 \quad +1 \end{array}$$

$$\frac{2x}{2} = \frac{4}{2}$$

$$\boxed{x=2}$$

d. $\frac{1}{5}^{3x-2} = 25^{x+4}$

$$5^{-1(3x-2)} = 5^{2(x+4)}$$

$$\begin{array}{r} -3x+2 = 2x+8 \\ -2x \quad -2x \end{array}$$

$$\frac{-5x+2}{-2} = \frac{8}{-2}$$

$$\frac{-5x}{-5} = \frac{6}{-5}$$

$$\boxed{x = -6/5}$$

f. $3^{3x-1} = 81^{3x}$

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

$$\begin{array}{r} 3x-1 = 12x \\ -3x \quad -3x \end{array}$$

$$\frac{-1}{9} = \frac{9x}{9}$$

$$\boxed{x = -1/9}$$

$$g. 9^{x+2} = \left(\frac{1}{27}\right)^x$$

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

$$\begin{array}{r} 2x+4 = -3x \\ -2x \quad -2x \end{array}$$

$$\begin{array}{r} 4 = -5x \\ -5 \quad -5 \end{array}$$

$$\boxed{x = -4/5}$$

$$i. 2^{x-1} = 4^{3x-1}$$

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

$$\begin{array}{r} x-1 = 6x-2 \\ -x+2 \quad -x+2 \end{array}$$

$$\begin{array}{r} 1 = 5x \\ 5 \quad 5 \end{array}$$

$$\boxed{x = 1/5}$$

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

$$\begin{array}{r} -1 \quad -1 \end{array}$$

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

$$3^{2x} = 3^0$$

$$2x = 0$$

$$\boxed{x = 0}$$

$$h. 2 = 16^{4x}$$

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

$$\begin{array}{r} 1 = 16x \\ 16 \quad 16 \end{array}$$

$$\boxed{x = 1/16}$$

$$j. 3^x = 9\sqrt{3}$$

$$3^x = 3^2 \cdot 3^{1/2}$$

$$3^x = 3^{5/2}$$

$$\boxed{x = 5/2}$$

$$l. 3(5^{x+1}) = 15$$

$$\begin{array}{r} 3 \quad 3 \end{array}$$

$$5^{x+1} = 5^1$$

$$\begin{array}{r} x+1 = 1 \\ -1 \quad -1 \end{array}$$

$$\boxed{x = 0}$$

4. Describe how to determine the solution of $2^{x-1} = 3^{x-2}$ graphically, and give the value of x to the nearest tenth.

$y_1 = 2^{x-1}$
 $y_2 = 3^{x-2}$ Find x -value at intersection:
 $x = 3.7$

Numerical Response

1. To the nearest hundredth, the value of x that satisfies the equation $5^x = 625^{8x-1}$ is _____.

(Record your answer in the numerical-response section on the answer sheet.)

$5^x = 5^{4(8x-1)}$
 $1x = 32x - 4$
 $-32x \quad -32x$
 $-31x = -4$
 $\frac{-31x}{-31} = \frac{-4}{-31}$
 $x = 4/31 \approx 0.13$

5. The graph of $y = a^{x-2}$ has a y-intercept of

- A. $\frac{1}{a^2}$
 B. $-\frac{1}{a^2}$
 C. $-a^2$
 D. 2

$x=0$
 $y = a^{0-2}$
 $y = a^{-2}$
 $y = \frac{1}{a^2}$

Use the following information to answer the next question.

The point $P\left(-1, \frac{1}{3}\right)$ lies on the graph of the exponential function $f(x) = b^x$.

6. The value of the base, b , of the exponential function, f , is

- A. $\frac{1}{3}$
 B. 3
 C. $-\frac{1}{3}$
 D. -3

$\frac{1}{3} = b^{-1}$
 $\frac{1}{3} = \frac{1}{b}$

$b = 3$