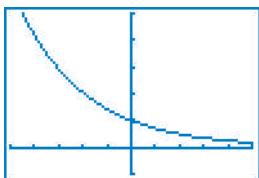## Checkpoint 1: Assess Your Understanding, pages 371–374
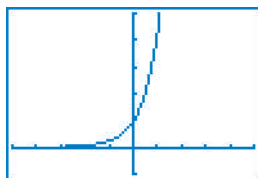
5.1

1. Use technology to graph each function below. Sketch or print the graph. For each graph, identify its intercepts and the equation of its asymptote.

a) $y = 0.7^x$

b) $y = 4.25^x$

There is no *x*-intercept.
The *y*-intercept is 1.
The equation of the asymptote is $y = 0$.

There is no *x*-intercept.
The *y*-intercept is 1.
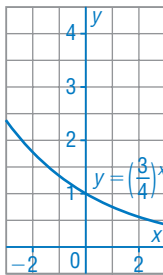The equation of the asymptote is $y = 0$.

2. Multiple Choice Which equation describes a function whose graph can be obtained by compressing the graph of $y = 10^x$ horizontally by a factor of $\frac{1}{3}$, then translating the graph 2 units up?

A. $y - 2 = 10^{3x}$ **B.** $y = 3(10^{x-2})$

C. $y - 2 = \frac{1}{3}(10^x)$ **D.** $y + 2 = 10^{\frac{x}{3}}$

3. Graph each exponential function below. Determine:

    i) whether the function is increasing or decreasing
    ii) the intercepts
    iii) the equation of the asymptote
    iv) the domain of the function
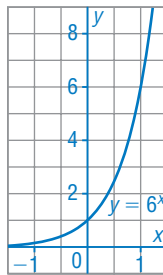   **v)** the range of the function

a) $y = \left(\frac{3}{4}\right)^x$ **b)** $y = 6^x$

x	y
-3	$2.\overline{370}$
-2	$1.\overline{7}$
-1	$1.\overline{3}$
0	1
1	0.75
2	0.5625
3	$0.421\ 875$

x	y
-2	$0.02\overline{7}$
-1	$0.1\overline{6}$
0	1
1	6
2	36

i) The function is decreasing.
ii) The graph has no x-intercept. Its y-intercept is 1.
iii) The equation of the asymptote is $y = 0$.
iv) The domain is: $x \in \mathbb{R}$
v) The range is: $y > 0$

i) The function is increasing.
ii) The graph has no x-intercept. Its y-intercept is 1.
iii) The equation of the asymptote is $y = 0$.
iv) The domain is: $x \in \mathbb{R}$
v) The range is: $y > 0$

4. a) Use transformations to sketch the graph of $y + 2 = 2^{3x}$.
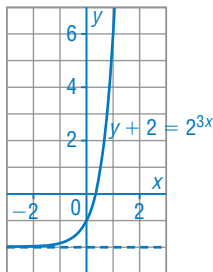
Compare $y + 2 = 2^{3x}$ with $y - k = c2^{d(x-h)}$:
$k = -2, c = 1, d = 3,$ and $h = 0$
The graph of $y + 2 = 2^{3x}$ is the image
of the graph of $y = 2^x$ after a
horizontal compression by a factor of $\frac{1}{3}$,
then a translation of 2 units down.
The point (x, y) on $y = 2^x$ corresponds
to the point $\left(\frac{x}{3}, y - 2\right)$ on
$y + 2 = 2^{3x}$.

(x, y)	$\left(\frac{x}{3}, y - 2\right)$
$(-3, 0.125)$	$(-1, -1.875)$
$(-1, 0.5)$	$(-0.\overline{3}, -1.5)$
$(0, 1)$	$(0, -1)$
$(1, 2)$	$(0.\overline{3}, 0)$
$(3, 8)$	$(1, 6)$

b) Determine:

i) whether the function is increasing or decreasing

The function is increasing.

ii) the intercepts

From the table, the x-intercept is $\frac{1}{3}$ and the y-intercept is -1.

iii) the equation of the asymptote

Since the translation is 2 units down, the horizontal asymptote has
equation $y = -2$.

iv) the domain of the function

The domain is $x \in \mathbb{R}$.

v) the range of the function

The range is $y > -2$.

5.3

5. Multiple Choice Which equation has the solution $x = -3$?

A. $5^x = \left(\sqrt[3]{625}\right)^{x+1}$ **B.** $5^x = \left(\sqrt[3]{625}\right)^{x-1}$

C. $5^{x+1} = \left(\sqrt[3]{625}\right)^x$ **(D.)** $5^{x-1} = \left(\sqrt[3]{625}\right)^x$

6. Solve each equation.

a) $9^{x+2} = 27^x$ **b)** $\left(\dfrac{1}{8}\right)^x = 4\sqrt{2}$

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

$2x + 4 = 3x$ $2^{-3x} = 2^{2+\frac{1}{2}}$

$x = 4$ $-3x = \dfrac{5}{2}$

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

7. Use graphing technology to solve each equation. Give the solution to the nearest tenth.

a) $2^x = 50$ **b)** $4^{x-2} = 3^{x-1}$

Graph: $y = 50 - 2^x$ Graph: $y = 3^{x-1} - 4^{x-2}$

The approximate zero is   The approximate zero is 5.8188417

5.6438562 $x \doteq 5.8$

$x \doteq 5.6$

8. A principal of $500 is invested in a savings account that pays 3.5% annual interest, compounded quarterly. To the nearest half year, when will the amount be $700?

Use: $A = A_0\left(1 + \dfrac{i}{n}\right)^{nt}$ Substitute: $A = 700$, $A_0 = 500$, $i = 0.035$, $n = 4$

$700 = 500\left(1 + \dfrac{0.035}{4}\right)^{4t}$

Graph $y = 500\left(1 + \dfrac{0.035}{4}\right)^{4t} - 700$, then determine the zero of the function.

The approximate zero is 9.6554904

It will take approximately 9.5 years for the investment to amount to $700.