Consider the function $f(x) = 4^{x+2} - 6$. Without using a graphing calculator, determine

a) the domain and range of the function

$y = 4^x$ is translated 2 units left, 6 units down to get $f(x)$

$x \in R$, $y | y > -6$

b) the y-intercept of the graph of the function

$(x, 0)$ $\quad y = 4^{0+2} - 6$

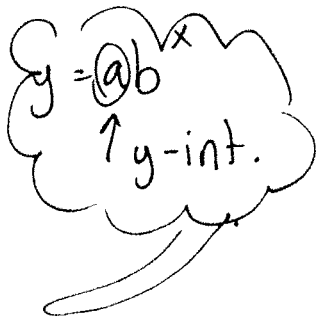
$y = 16 - 6 = 10$ $\quad y\text{-int} = 10$

c) the equation(s) of any asymptotes of the graph of the function

horizontal asymptote $y = -6$

Complete Assignment Questions #1 - #11

Assignment



1. State the x and y-intercepts for the graphs of the following:

a) $f(x) = 2^x$ **b)** $f(x) = (2)10^x$ **c)** $f(x) = 2^{10x}$ **d)** $y = \left(-\frac{1}{2}\right)\left(\frac{3}{5}\right)^x$

	a)	b)	c)	d)
x-int	none	none	none	none
y-int	1	2	1	$-\frac{1}{2}$

2. a) State the domain and range of the function $f(x) = ab^x, a, b > 0, x \in R$.

$x \in R$ $\quad y | y > 0, y \in R$.

b) Which of the following transformations applied to the graph of $y = ab^x, a, b > 0, x \in R$ would result in a change to the **domain** of the function?

i) horizontal stretch about the y-axis

ii) vertical stretch about the x-axis

iii) horizontal translation

iv) reflection in the x-axis

v) reflection in the y-axis

vi) reflection in the line $y = x$

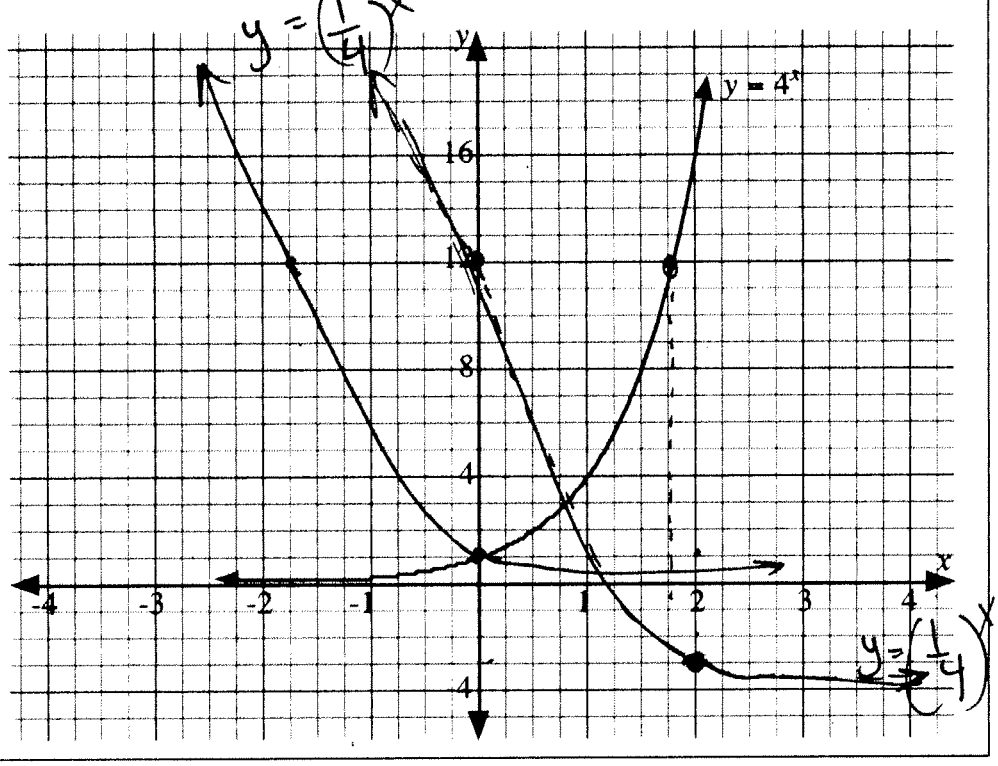
vi) only

c) Which of the above transformations applied to the graph of $y = ab^x, a, b > 0, x \in R$, would result in a change to the **range** of the function?

iv) & vi)

Use the following information to answer the next question.

The graph of the exponential function with equation $y = 4^x$ is shown.



3. a) Use the graph to **estimate**, to one decimal place, the solution to the equation $4^x = 12$.

1.8

b) Use a graphing calculator to determine, to one decimal place, the solution to the equation $4^x = 12$. 1.8

c) Explain how to use the graph of $y = 4^x$ to graph the function with equation $y = \left(\frac{1}{4}\right)^x$

Sketch the graph on the grid.

$\left(\frac{1}{4}\right)^x = 4^{-x}$ so $x \to -x$

d) Without using the grid or a graphing calculator, state the solution to the equation $\left(\frac{1}{4}\right)^x = 12$. -1.8

e) Use transformations to sketch the graph of the function with equation $y = \left(\frac{1}{4}\right)^{x-2} - 4$ and state the domain and the range of the function.

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

$x \to x - 2$ - 2 units right

$y \to y + 4$ - 4 units down

$x \in \mathbb{R}$

$y \mid y > -4, y \in \mathbb{R}$.

y-int $\left(\frac{1}{4}\right)^{0-2} - 4$

$= 12$

SRT

4. Describe how the graph of the second function compares to the graph of the first functior

a) $y = 10^x$, $y = 10^{-x} - 3$

$x \to -x$, reflection in y-axis
$y \to y+3$, translation 3 units down

b) $y = 2^x$, $y = 5\left(\frac{1}{2}\right)^x$ $\quad \frac{1}{5}y = 2^{-x}$

$y \to \frac{1}{5}y$ - vert. stretch by factor of 5,
$x \to -x$ reflection in y-axis

c) $y = 6^x$, $y = \left(\frac{1}{6}\right)^{-x}$ $\quad y = 6^x$

identical, no change

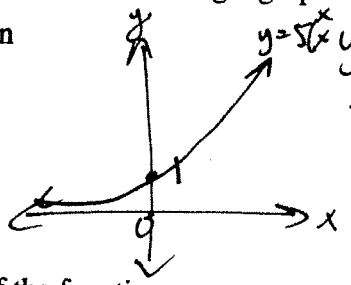
d) $y = a^x$, $y = -a^{\frac{x}{2}}$

$x \to \frac{1}{2}x$ - horiz. stretch by factor of 2
$y \to -y$ - reflection in x-axis.

5. Consider the function $y = f(x) = 5^{x+4} + 3$. Without using a graphing calculator, determin

a) the domain and range of the function

$x \in R$
$y \mid y > 3, y \in R$.



$y - 3 = 5^{x+4}$
$x \to x+4$ $\quad y \to y-3$
-4 units left + 3 units up.

b) the x and y-intercepts of the graph of the function

no x-int. y-int, $x = 0$ $\quad y = 5^4 + 3 = 628$

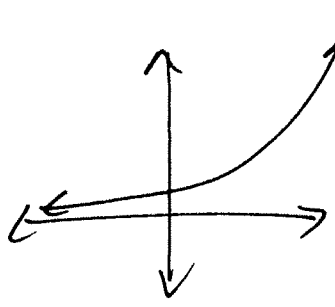
c) the equation(s) of any asymptotes of the graph of the function

$y = 3$

6. Consider the function $f(x) = b^{x-h} + k$. Determine

a) the domain and range of the function

$x \in R$
$y \mid y > k, y \in R$.



$y - k = b^{x-h}$
$x \to x-h$
$y \to y-k$
-h units right + k units up.

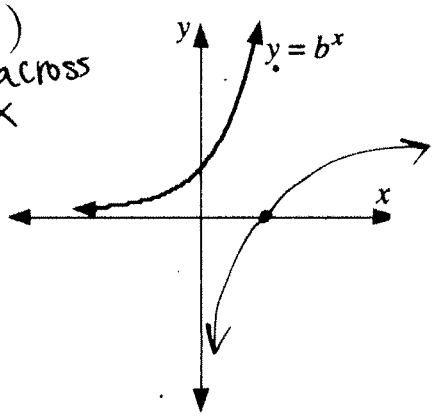
b) the y-intercept of the graph of the function

$x = 0$, $y = b^{-h} + k$, y-int $= b^{-h} + k$

c) the equation of the horizontal asymptote of the graph of the function

$y = k$

7. The graph of $f(x) = b^x$ is shown. Sketch $f^{-1}(x)$. $(y \leftrightarrow x)$ reflect across $y=x$



a) State the domain and range of $f(x)$.

$x \in R$, $y \mid y > 0$, $y \in R$

b) State the domain and range of $f^{-1}(x)$.

$x \mid x > 0$, $x \in R$, $y \in R$.

c) State the asymptotes for $y = f(x)$ and $y = f^{-1}(x)$.

$y = 0$, $x = 0$

d) Write the equation for the inverse function in the form $x = f(y)$ and try to solve for y. Explain what happens.

$y = b^x$ inverse $x = b^y$ ⇕ can't .... yet.

$y \leftrightarrow x$

Multiple Choice

8. Which equation represents an exponential function? → $y = ab^{(x)}$ ← key where $b > 0$.

A. $y = 2x^8$ **B.** $y = (-3)^x$ base < 0 **(C.)** $y = \frac{3^{x-2}}{2}$ **D.** $y = \frac{1}{3x}$

Use the following information to answer the next question.

A student is attempting to sketch the graph of the function $f(x) = 3^{x-2} - 1$ without using a graphing calculator.

9. Which of the following is an asymptote of the graph?

$y + 1 = 3^{x-2}$

$y = 3^x$ translated 2 units (R) and 1 unit ↓.

A. $x = -2$ **B.** $x = 2$

C. $y = 1$ **(D.)** $y = -1$

10. The range of f is

A. $f(x) \in R$ **B.** $\{f(x) \mid f(x) > -2, f(x) \in R\}$

C. $\{f(x) \mid f(x) \geq -1, f(x) \in R\}$ **(D.)** $\{f(x) \mid f(x) > -1, f(x) \in R\}$

11. The x-intercept of the graph is

A. 0 **(B.)** 2 **C.** 3 **D.** there is no x-intercept

let $y = 0$

$0 = 3^{x-2} - 1$

$3^{x-2} = 1$

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

$x - 2 = 0$

$x = 2$