

Pre-Calculus Review
Exponential & Logarithmic Functions

Name Key

Date _____ Period _____

PC Reporting Strand: Exponential & Logarithmic Functions (Key Features and Transformations)

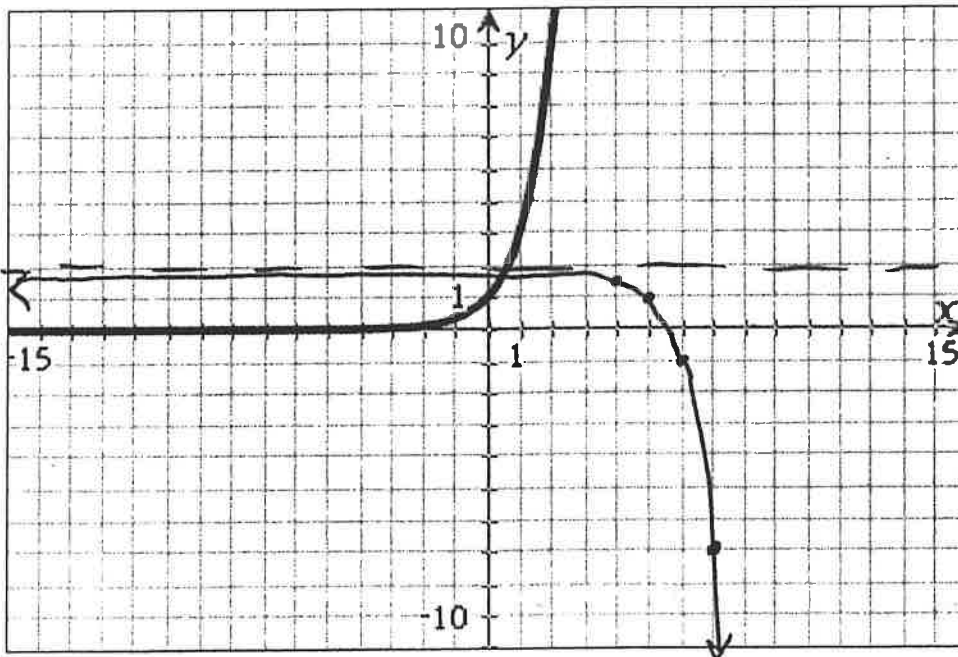
1. Given the original function, $f(x) = 3^x$ and the transformed function, $g(x) = -3^{x-5} + 2$ answer the questions below.

a) Describe the transformations that occur between $f(x)$ and $g(x)$.

Reflect over x-axis

Right 5, Up 2

b) Graph the transformed function below given the graph of $f(x)$.



$(x, y) \rightarrow (x+5, -y+2)$
 $(-1, \frac{1}{3}) \rightarrow (4, 1.\bar{6})$
 $(0, 1) \rightarrow (5, 1)$
 $(1, 3) \rightarrow (6, -1)$
 $(2, 9) \rightarrow (7, -7)$

c) Identify the key features of $g(x)$.

x-intercept: (5.5, 0) y-intercept: (0, 1.99)

Guess

Asymptote: $y = 2$

End Behavior: As $x \rightarrow -\infty$, $g(x) \rightarrow 2$

As $x \rightarrow \infty$, $g(x) \rightarrow -\infty$

2. Given the original function, $f(x) = \log x$ and the transformed function, $g(x) = 4 \log(x + 4) - 2$ answer the questions below.

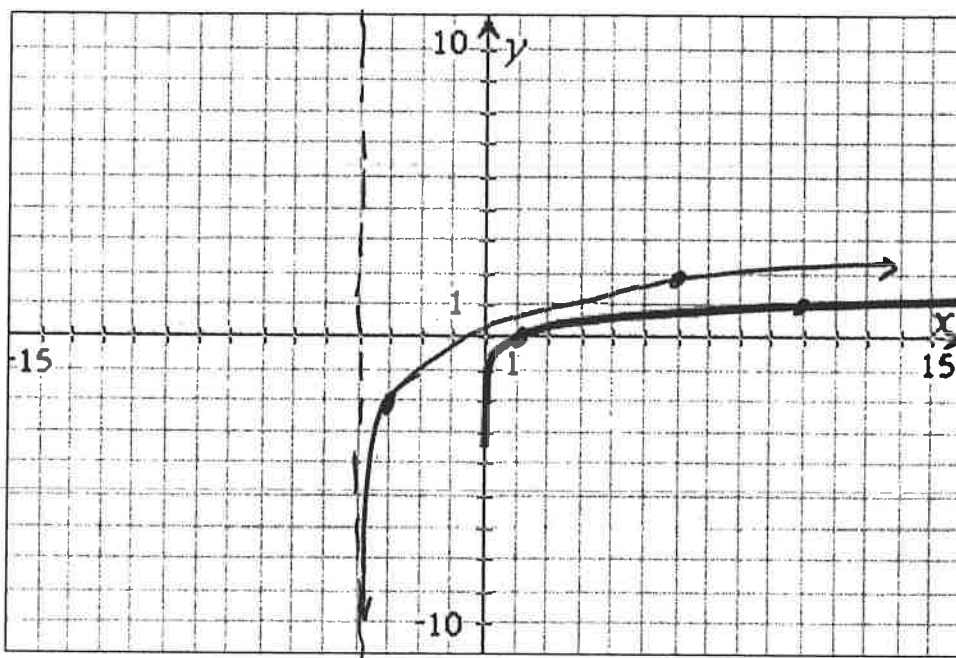
a) Describe the transformations that occur between $f(x)$ and $g(x)$.

Vertical stretch by 4

Left 4

Down 2

b) Graph the transformed function below given the graph of $f(x)$.



$$(x, y) \rightarrow (x-4, 4y-2)$$

$$(1, 0) \rightarrow (-3, -2)$$

$$(10, 1) \rightarrow (6, 2)$$

c) Identify the key features of $g(x)$.

x-intercept: $(-0.5, 0)$ y-intercept: $(0, 0.3)$

Asymptote: $X = -4$

Guess

End Behavior: As $x \rightarrow -4$, $g(x) \rightarrow -\infty$

As $x \rightarrow \infty$, $g(x) \rightarrow \infty$

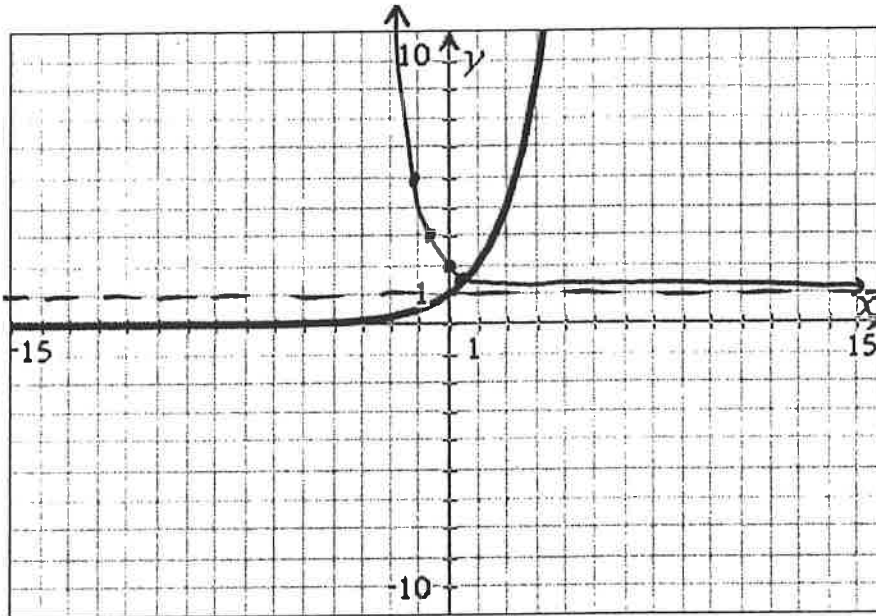
3. Given the original function, $f(x) = 2^x$ and the transformed function, $g(x) = 2^{-2x} + 1$ answer the questions below.

a) Describe the transformations that occur between $f(x)$ and $g(x)$.

Reflect over y-axis

Horizontal shrink by 2 up 1

b) Graph the transformed function below given the graph of $f(x)$.



$$(x, y) \rightarrow \left(-\frac{x}{2}, y+1\right)$$

$$\left(-1, \frac{1}{2}\right) \rightarrow \left(\frac{1}{2}, 1.5\right)$$

$$(0, 1) \rightarrow (0, 2)$$

$$(1, 2) \rightarrow \left(-\frac{1}{2}, 3\right)$$

$$(2, 4) \rightarrow (-1, 5)$$

c) Identify the key features of $g(x)$.

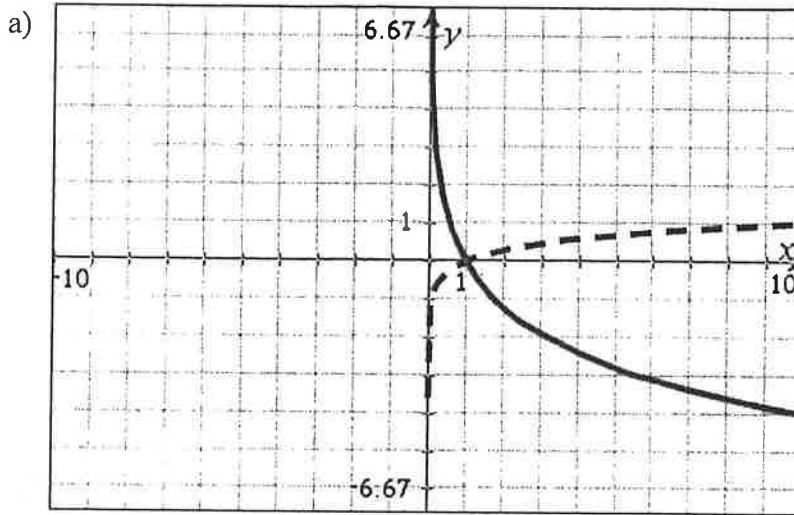
x-intercept: None y-intercept: (0, 2)

Asymptote: $y = 1$

End Behavior: As $x \rightarrow -\infty$, $g(x) \rightarrow \infty$

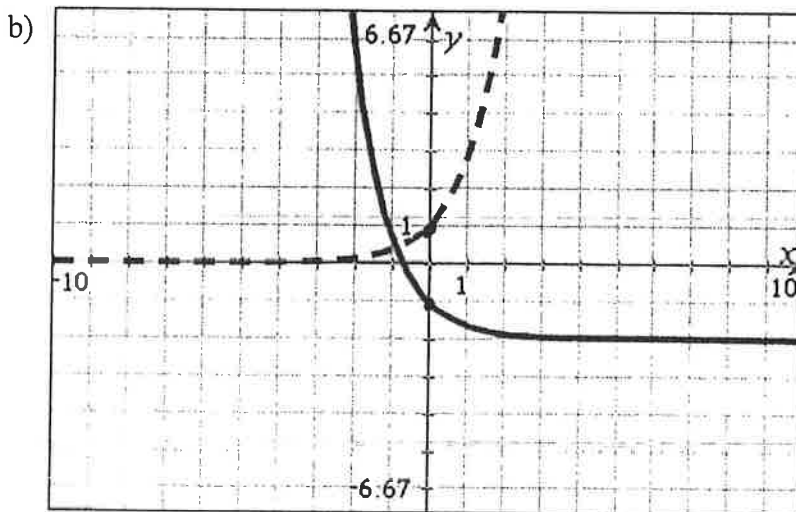
As $x \rightarrow \infty$, $g(x) \rightarrow 1$

3. Based on the graph of the original function (dashed lines) write an equation that represents the graph of the transformed function (bold lines).



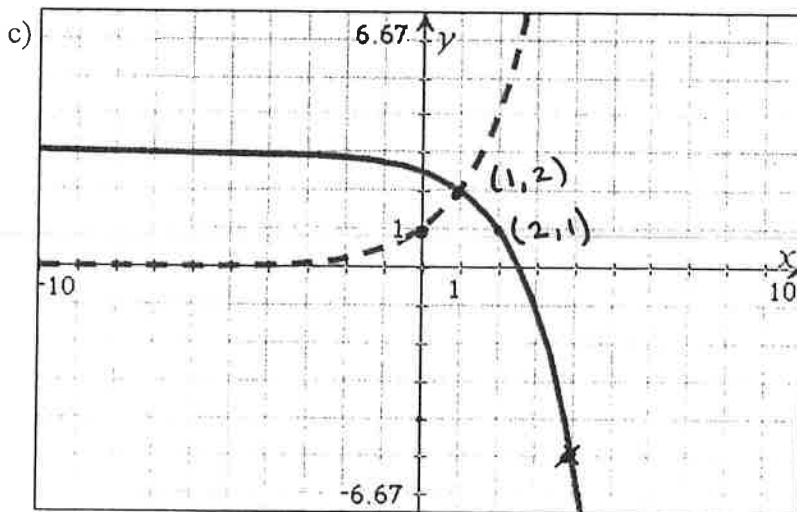
$f(x) = \log x$
 Reflect over x-axis
 Vertical stretch
 by 4

$$g(x) = -4 \log x$$



$f(x) = e^x$
 Down 2
 Reflect over y-axis

$$g(x) = e^{-x} - 2$$



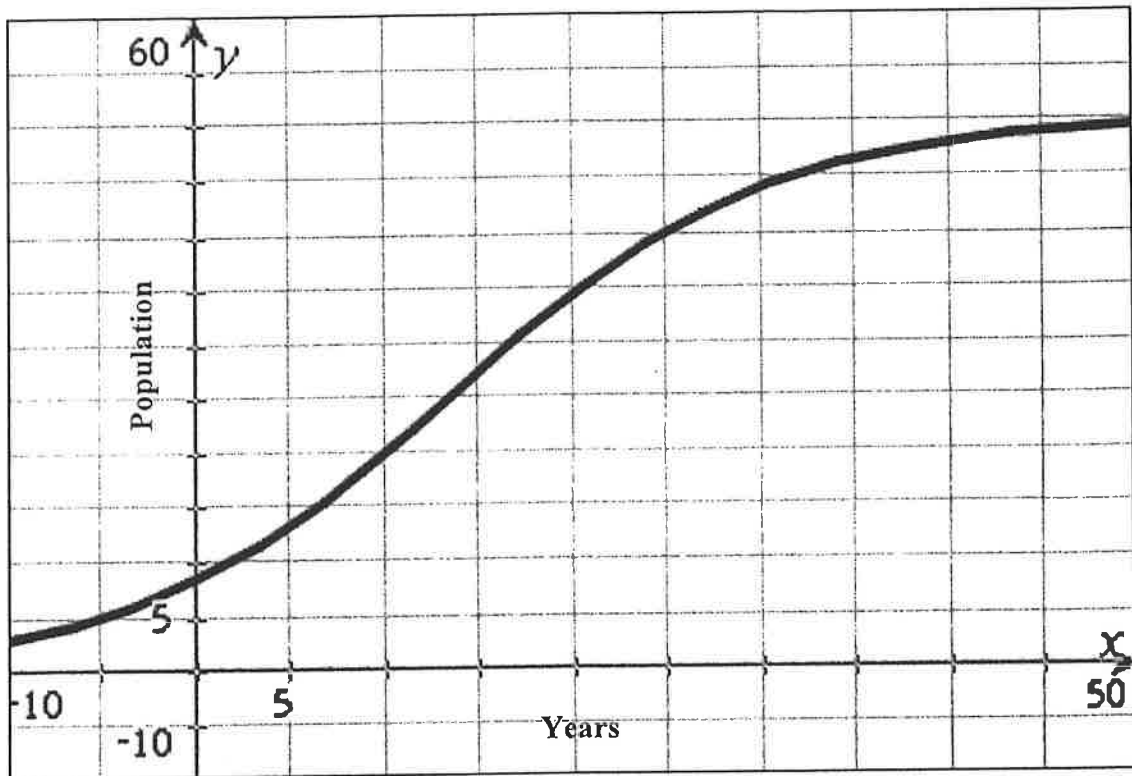
$f(x) = 2^x$
 Up 3
 Reflect over x-axis

Right 1

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

4. The population of a small country increases according to the function graphed below, where x is measured in years and y is population measured in thousands. Use the graph to identify the key features and determine the importance of each key feature with respect to this problem.

*tell them
 $x=0$ is the year 1800



y-intercept: about 9 thousand

Significance of y-intercept: There were about 9 thousand people in 1800

Asymptote: $y = 50$

Significance of asymptote: The limit of the population is 50 thousand

