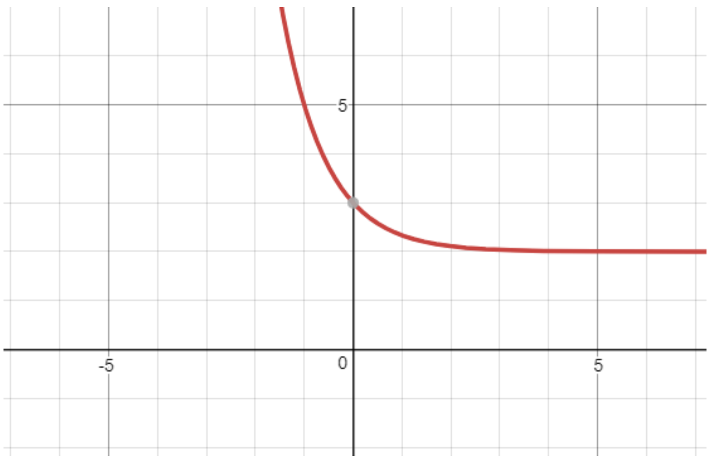
Progress Check Follow-Up **HN**: Exponential Transformations (B12) Name: ______________________________

1) The graph below is a transformation of the parent function $f(x) = 3^x$. Describe in words what transformation has occurred then write the equation of the graph in terms of $f(x)$.

$g(x)$



Description of Transformation:

First, I notice that it looks like an exponential decay function, but the base is greater than 1. This means it must be **reflected over the y-axis**.

I also notice that the horizontal asymptote has been moved from y=0 to y=2. Therefore, there has been a **vertical shift up 2 units**.

Equation in terms of $f(x)$:

A reflection over the y-axis will be represented by making the input, x, opposite.

A vertical shift will affect the output, so we would add 2 to f(x). The resulting equation will be

$$\boldsymbol{g(x) = f(-x) + 2}$$

2) Describe the transformation performed on m(x) that produced t(x). Then write an exponential equation for t(x).

$$m(x) = e^x$$
$$t(x) = 2m(x + 1) - 2$$

Anything that happens directly to the input, x, indicates a horizontal change. Since (x-h) means that a function has been shifted h units to the right, I can rewrite (x+1) as (x-(-1)). Therefore, m(x) has been **shifted left 1 unit**.

Anything that happens to the output, m(x), indicates a vertical change. The coefficient of 2 indicates a **vertical stretch by a factor of 2**..

The -3 at the end indicates a **shift down 2 units**.

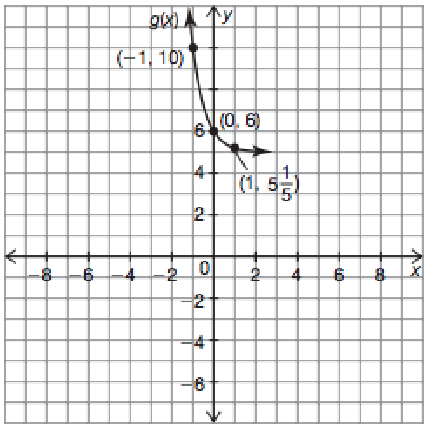
When writing an exponential equation for t(x), we change the parent function, m(x)=e^x, by adding 1 to the exponent, giving the function a coefficient of 2, and subtracting 3 at the end:

$$\boldsymbol{t(x) = 2e^{x+1} - 2}$$

****Additional Practice on the Back****

Additional Practice:

1. The graph below is a transformation of the parent function $f(x) = 5^x$. Describe in words what transformation has occurred. Then write the equation of the graph in terms of f(x).



Description of transformation:

Equation in terms of f(x):

2. Describe the transformation performed on m(x) that produced t(x). Then write an exponential equation for t(x).

$m(x) = 3^x$
$t(x) = -m(x + 1)$

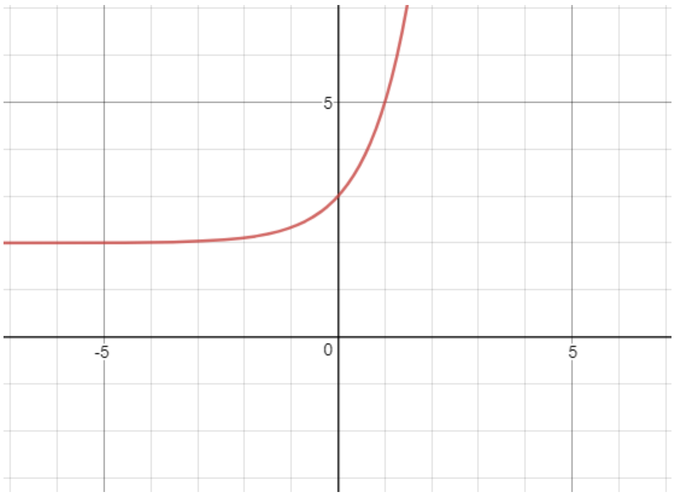
$m(x) = e^x$
$t(x) = \frac{1}{2}m(x) + 4$

$m(x) = 6^x$
$t(x) = -2m(-x) + 3$

Progress Check Follow-Up **CP**: Exponential Transformations (B12) Name: ______________________________

1) The graph below is a transformation of the parent function $f(x) = 3^x$. Describe in words what transformation has occurred then write the equation of the graph.

$g(x)$



Description of Transformation:

I notice that the horizontal asymptote has been moved from y=0 to y=2. Therefore, there has been a **vertical shift up 2 units**.

Equation: $g(x)$=

A vertical shift will affect the output, so we would add 2 to f(x). So,

$$\boldsymbol{g(x) = f(x) + 2}$$

Then we can replace $\boldsymbol{f(x)}$ with $\boldsymbol{3^x}$ and the resulting equation would be

$$\boldsymbol{g(x) = 3^x + 2}$$

2) Describe the transformation performed on m(x) that produced t(x).

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

Anything that happens directly to the input, x, indicates a horizontal change. Since (x-h) means that a function has been shifted h units to the right, I can rewrite (x+1) as (x-(-1)). Therefore, m(x) has been **shifted left 1 unit**.

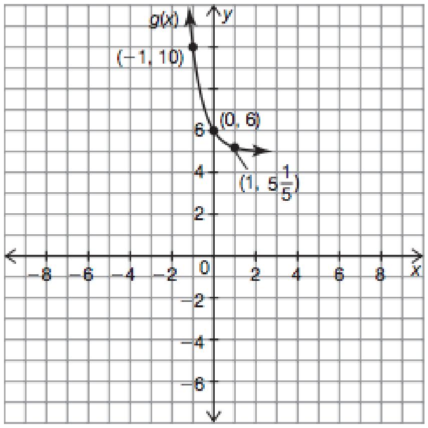
Anything that happens to the output, m(x), indicates a vertical change. The coefficient of 2 indicates a **vertical stretch by a factor of 2**.

The -3 at the end indicates a **shift down 2 units**.

****Additional Practice on the Back****

Additional Practice:

1. The graph below is a transformation of the parent function $f(x) = 5^x$. Describe in words what transformation has occurred. Then write the equation of the graph.



Description of transformation:

Equation: $g(x)$=

2. Describe the transformation performed on m(x) that produced t(x).

a. $m(x) = 3^x$
$t(x) = -3^{x+1}$

b. $m(x) = e^x$
$t(x) = \frac{1}{2}e^x + 4$

c. $m(x) = 6^x$
$t(x) = -2(6^{-x}) + 3$