C12 - 7.1 - Simplifying/Solving Exponents Notes

$$\frac{3^4 \times 3^{-3}}{9} = \frac{3^1}{3^2} = \frac{1}{3}$$

Add Exponents
Simplify

$$\frac{4^2 \times 16^3}{128^2} =$$
$$\frac{\left((2^2)^2 \times (2^4)^3\right)}{(2^7)^2} =$$
$$\frac{2^4 \times 2^{12}}{2^{14}} =$$
$$\frac{2^{16}}{2^{14}} = 2^{(16-14)} = 2^2 = 4$$

Change of base
Multiply Exponents
Add Exponents

Subtract Exponents
Simplify

$2^x = 4^2$
$2^x = (2^2)^2$
$2^x = 2^4$
$x = 4$

Change of Base
Multiply Exponents
Solve

$4 = 2^2$

$2^x 2^1 = 2^5$
$2^{x+1} = 2^5$
$x + 1 = 5$
$x = 4$

Add Exponents

Solve

$4^{x+1} = 8^{2x-2}$
$(2^2)^{x+1} = (2^3)^{2x-2}$
$2^{2x+2} = 2^{6x-6}$
$2x + 2 = 6x - 6$
$8 = 4x$
$x = 2$

Change of Base
Multiply Exponents

Solve

$4 = 2^2$ $8 = 2^3$

$2^{x^2-x} = 1$
$2^{x^2-x} = 2^0$
$x^2 - x = 0$
$x(x-1) = 0$

$x = 0 \quad x = 1$

Change of Base

Factor

Solve

$2^0 = 1$

$2^{x^2-3x} = \frac{1}{4}$
$2^{x^2-3x} = 2^{-2}$
$x^2 - 3x = -2$
$x^2 - 3x + 2 = 0$
$(x-2)(x-1) = 0$

$x = 2 \quad x = 1$

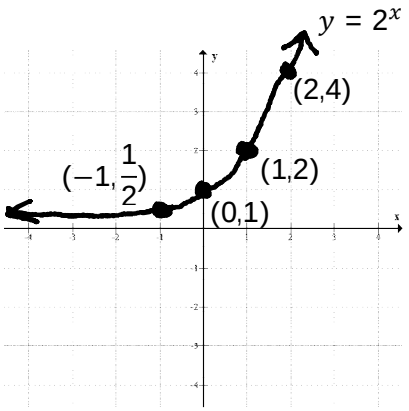
Change of Base

Factor

Solve

$2^{-2} = \frac{1}{2^2} = \frac{1}{4}$

C12 - 7.2 - Exponent Reflections Graphs Notes



x	y
-1	$\frac{1}{2}$
0	1
1	2
2	4

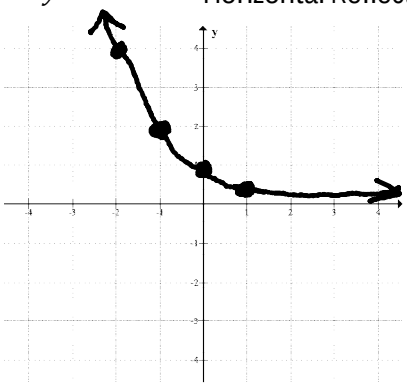
$2^{-1} = \frac{1}{2}$ $\quad (-1,\frac{1}{2})$

$2^0 = 1$ $\quad (0,1)$

$2^1 = 2$ $\quad (1,2)$

$2^2 = 4$ $\quad (2,4)$

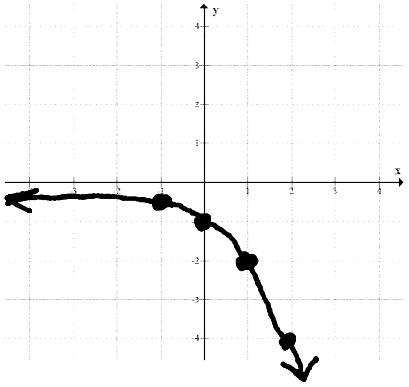
$y = 2^{-x}$ Horizontal Reflection



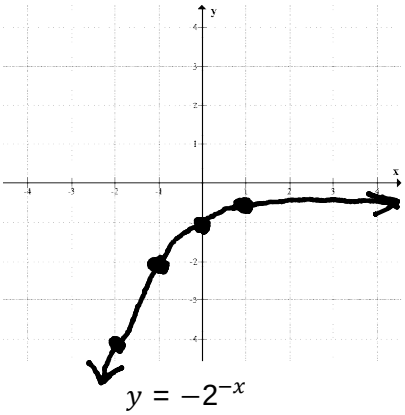
$y = \left(\frac{1}{2}\right)^x$

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

Remember: Positive Open up to the right
Remember: Negative exponents and fractions open up to the left



$y = -2^x$ Vertical Reflection



$y = -2^{-x}$ Vertical Reflection and Horizontal Reflection