PAP Algebra 2: 12.1 Notes

Exponentials and Logarithms as Inverses

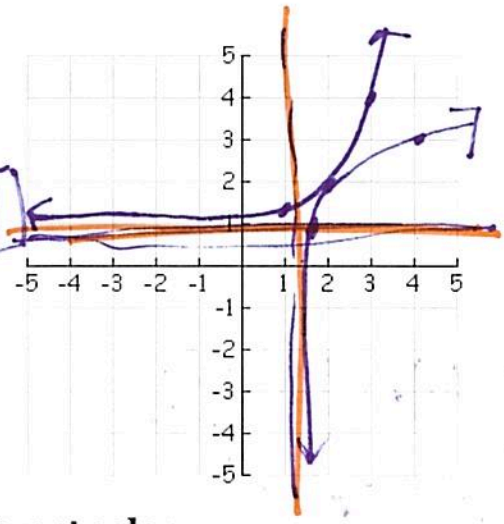
A. Graph the Exponential Function: $y = 3^{x-2} + 1$

x+2	x	y	y+1
1	-1	1/3	4/3
2	0	1	2
3	1	3	4

inverse

4/3	1
2	2
4	3

$y = 1$



B. **Graph the Inverse of the function above in a different color.**

C. **Determine the equation for the inverse.**

Steps:

1. Switch x & y.
2. Isolate Exponential.
3. Convert to Logarithm.
4. Solve for y.

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

$\log_3(x-1) = y-2$

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

$y = \log_3(x-1) + 2$

$x = 1$

Find the Inverse function of the following Exponential functions.

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

$x = (1/2)^{y+3} - 4$

$+4 \quad +4$

$x + 4 = (1/2)^{y+3}$

$\log_{1/2}(x+4) = y+3$

$y = \log_{1/2}(x+4) - 3$

$x = -4$

2. $y = 4^{x+2}$

$x = 4^{y+2}$

$\log_4(x) = y+2$

$\log_4(x) - 2 = y$

$x = 0$

3. $y = 2^{x-4} + 3$

$x - 3 = 2^{y-4}$

$\log_2(x-3) = y-4$

$\log_2(x-3) + 4 = y$

$x = 3$

4. $y = e^{x-1}$

$\log_e(y) = x-1$

$\log_e(x) + 1 = y$

$\ln(x) + 1 = y$

$x = 0$

Find the Inverse function of the following Logarithmic functions.

Steps:

1. Switch x & y. 2. Isolate Logarithm. 3. Convert to Exponential. 4. Solve for y.

5. $y = \log_5(x-1)+2$

$x = \log_5(y-1)+2$

$-2 \quad -2$

$x-2 = \log_5(y-1)$

$5^{x-2} = y-1$

$y = 5^{x-2}+1$

$y = 1$

6. $y = \log_3 x - 2$

$+2 \quad +2$

$x+2 = \log_3 y$

$3^{x+2} = y$

$y = 0$

7. $y = \log(x+5)$

10

$10^x = y+5$

$10^x - 5 = y$

$y = -5$

7. $y = \ln x + 6$

$-6 \quad e \quad -6$

$x-6 = \ln(y)$

$e^{x-6} = y$

$y = 0$