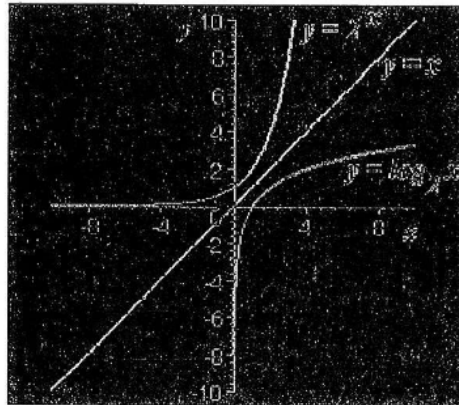


Finding Inverses of Exponential and Log Functions Notes



* The inverse of an exponential function is a log function.

* The inverse of a log function is an exponential function.

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 We can convert forms following the rule:

$$\begin{array}{l}
 y = b^x \text{ -----} \rightarrow \log_b y = x \\
 \qquad \qquad \qquad \qquad \qquad \qquad \& \\
 \log_b y = x \text{ -----} \rightarrow y = b^x
 \end{array}$$

To find the inverse of either of these functions, simply convert forms, then switch the 'x' and 'y'.

1. Switch the x + y
2. Solve for y

Example 1:

Find the inverse of the following.

$$y = 5^x$$

$$x = 5^y \quad \leftarrow \text{put in log form}$$

$$\log_5 x = y$$

$$y = \log_5 x$$

Example 2:

Find the inverse of the following.

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

$$\begin{array}{r} x = 5^{y-2} + 1 \\ \hline -1 \qquad \qquad -1 \end{array}$$

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

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

+2

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

Example 3:

Find the inverse of the following.

$$y = \log_5 x - 3$$

$$x = \log_5 y - 3$$

$+3$                        $+3$

$$x + 3 = \log_5 y$$

$$\log_5 y = x + 3$$

$$5^{x+3} = y$$

Find the inverse:

1.  $y = \log_2 x + 1$

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

3.  $y = \log(x-9)$