

Natural Logarithm Functions

Aim

To introduce the natural logarithm function.

Learning Outcomes

At the end of this section you will:

- Understand what the natural logarithm function is,
- Understand the properties of the natural logarithm function,
- Know what the graph of the natural logarithm function looks like.

The natural logarithm function, \ln , can be defined as the inverse function of the exponential function which leads to the following identities:

$$e^{\ln(x)} = x \quad \text{if } x > 0.$$

$$\ln(e^x) = x.$$

Properties of the Natural Logarithm Function

The natural logarithm function has the following properties

- $\ln xy = \ln x + \ln y$
- $\ln \frac{1}{x} = -\ln x$
- $\ln \frac{x}{y} = \ln x - \ln y$
- $\ln x^a = a \ln x$

The Graph of the Natural Logarithm Function

The graph of the natural logarithm function can be determined by taking x values in the interval $(0,8]$ and finding the natural log of these values by using your calculator. The resulting graph should look something like the graph on the following page.

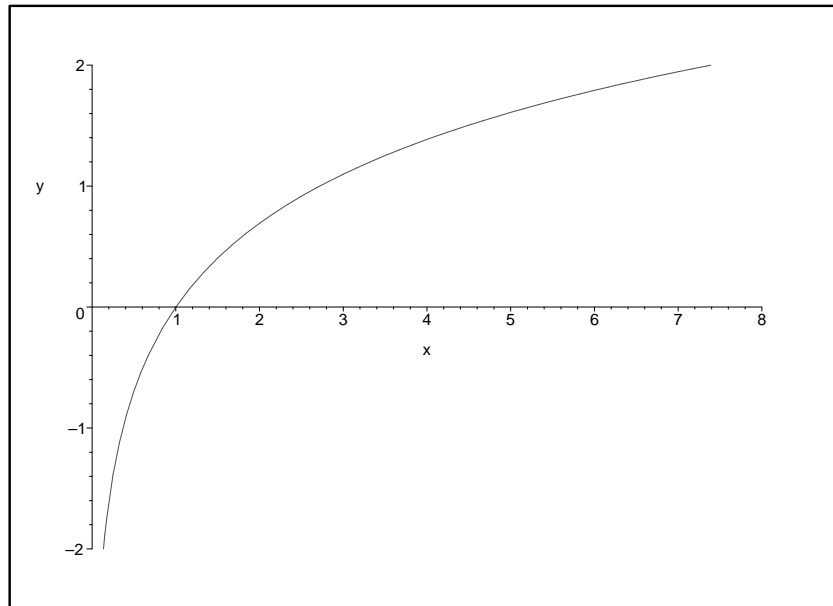


Figure 1: The graph of $y = \ln(x)$

Note that the function $y = \ln(x)$ will never touch or cross the negative y -axis.

Related Reading

Booth, D.J. 1998. *Foundation Mathematics*. 3rd Edition. Pearson Education Limited.

Croft, A., R. Davison. 2003. *Foundation Mathematics*. 3rd Edition. Pearson Education Limited.