MAC 1140 Section 6.4 Logarithmic Functions

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July 17, 2018

Objectives

Definition

The **logarithmic function with base a**, where $a > 0$ and $a \neq 1$, is denoted by

$$y = \log_a x$$

and is defined by

$$y = \log_a x \text{ if and only if } x = a^y$$

the domain of the logarithmic function $y = \log_a x$ is $x > 0$

Change Exponential Statements to Logarithmic Statements

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Change each exponential statement to an equivalent statement involving a logarithm

1. $1.2^3 = m$

2. $e^b = 9$

3. $a^4 = 24$

Change Logarithmic Statements to Exponential Statements

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1. $\log_a 4 = 5$

2. $\log_e b = -3$

3. $\log_3 5 = c$

Evaluate Logarithmic Expressions

To find the exact value of a logarithm:

1. Write the logarithm in exponential notation.

2. Use the fact that if $a^u = a^v$ then $u = v$

Example: Find the exact value of

1. $\log_2 16$

2. $\log_3 \frac{1}{27}$

Determine the domain of a Logarithmic Function

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Find the domain of each logarithmic function

1. $F(x) = \log_2(x + 3)$

2. $g(x) = \log_5 \frac{1+x}{1-x}$

3. $h(x) = \log_{1/2} |x|$