A3SR Math Review

Properties of Logarithms

Relevant Courses:

-Quantitative Methods
-Generalized Linear Models

Notes

Definition

Logarithms are defined such that $log_b(A) = X$ is equivalent to $b^X = A$

Properties

Using properties of exponents and the definition above, we can derive the following:

a. The Product Rule: $log_b(MN) = log_b(M) + log_b(N)$

b. The Quotient Rule: $log_b(\frac{M}{N}) = log_b(M) - log_b(N)$

c. The Power Rule: $log_b(M^p) = plog_b(M)$

d. $log_b(b^X) = X$

e. $b^{log_b(X)} = X$

f. $log_b b = 1$

g. $log_b 1 = 0$

Example 1: Expanding logarithms

$log_e(\frac{2x^3}{y})$
$= log_e(2x^3) - log_e(y)$
$= log_e(2) + log_e(x^3) - log_e(y)$
$= log_e(2) + 3log_e(x) - log_e(y)$

Example 2: Condensing logarithms

$2log_3(x) + log_3(5) - log_3(2)$
$= log_3(x^2) + log_3(5) - log_3(2)$
$= log_3(5x^2) - log_3(2)$
$= log_3(\frac{5x^2}{2})$

Practice Problems

1. Solve the following:
   a. $log_e(e^x)$
   b. $log_{10}(100)$
   c. $log_{10}(\frac{1}{10})$
   d. $log_{10}(0)$
2. Expand the following:
   a. $log_{10}(\frac{5y^3}{x})$
   b.

Matrix Algebra

Relevant Courses:

-Quantitative Methods

Derivatives

Relevant Courses:

-Probability
-Quantitative Methods

Integrals

Relevant Courses:

-Probability
-Quantitative Methods

Summary Statistics

Relevant Courses:

-Probability
-Quantitative Methods
-Statistical Computing

P-Values and T-Tests

Relevant Courses:

-Quantitative Methods
-Statistical Computing
-Causal Inference

Correlation and Covariance

Relevant Courses:

-Quantitative Methods
-Probability

Ordinary Least Squares Regression

Relevant Courses:

-Quantitative Methods

Probability Density/Mass Functions

Relevant Courses:

-Quantitative Methods
-Probability
-Causal Inference

Expectation

Relevant Courses:

-Probability