

Common Logarithms and Natural Logarithms

MATH 101 *College Algebra*

J Robert Buchanan

Department of Mathematics

Fall 2022

Objectives

In this lesson we will learn to:

- ▶ use base-10 logarithms as **common logarithms**,
- ▶ use base- e logarithms as **natural logarithms**,
- ▶ use a calculator to find the values of common logarithms,
- ▶ use a calculator to find the values of natural logarithms, and
- ▶ use a calculator to find the inverse logarithms for common and natural logarithms.

Common Logarithms

Definition

When $b = 10$ the logarithm with base $b = 10$ is called the **common logarithm** and is denoted

$$\log x = \log_{10} x.$$

Calculator: the sequence of keys pressed will depend on the model calculator you have.

On the TI-82/83/84:

1. press the **LOG** key,
2. enter the number,
3. enter right parenthesis **)**,
4. press the **ENTER** key.

On other scientific calculators:

1. enter the number,
2. press the **LOG** key.

Inverse of a Common Logarithm

Recall: logarithms are exponents, in other words if

$$\log x = N \quad \text{then} \quad 10^N = x.$$

The number x is the **inverse logarithm of N** or the **antilog of N** .

Calculator: the sequence of keys pressed will depend on the model calculator you have.

On the TI-82/83/84:

1. press the **2ND** key,
2. press the **LOG** key,
3. enter the number N ,
4. enter right parenthesis **)**,
5. press the **ENTER** key.

On other scientific calculators:

1. enter **10^(**
2. enter the number N ,
3. enter **)**,
4. press the **=** key.

Natural Logarithms

Definition

When $b = e$ the logarithm with base $b = e$ is called the **natural logarithm** and is denoted

$$\ln x = \log_e x.$$

Calculator: the sequence of keys pressed will depend on the model calculator you have.

On the TI-82/83/84:

1. press the **LN** key,
2. enter the number,
3. enter right parenthesis **)**,
4. press the **ENTER** key.

On other scientific calculators:

1. enter the number,
2. press the **LN** key.

Inverse of a Natural Logarithm

Recall: logarithms are exponents, in other words if

$$\ln x = N \quad \text{then} \quad e^N = x.$$

The number x is the **inverse natural logarithm of N** .

Calculator: the sequence of keys pressed will depend on the model calculator you have.

On the TI-82/83/84:

1. press the **2ND** key,
2. press the **LN** key,
3. enter the number N ,
4. enter right parenthesis **)**,
5. press the **ENTER** key.

On other scientific calculators:

1. enter **E^(**
2. enter the number N ,
3. enter **)**,
4. press the **=** key.