

MA 16010 Lesson 1: Precalculus review

Exponentiation. For numbers a, b , we consider a^b either

when _____ or _____.

Examples:

Properties of exponentiation:

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-
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An *exponential function* is a function of the form $f(x) = \underline{\hspace{2cm}}$. The

”best one” is the *natural exponential function* $f(x) = \underline{\hspace{2cm}}$, where

_____.

Exercise: Simplify the following expressions:

$$e^5 e^{-3} =$$

$$(e^{-2x})^5 =$$

$$\frac{e^{4x} e^3}{e^{7x}} =$$

Logarithm. The function $f(x) = \ln(x)$ is defined as _____
_____. It is called *the (natural) logarithm function*.

The domain of $\ln(x)$ is _____.

Properties of logarithm:

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Exercise: Simplify the following expressions:

$$\ln(3x) + \ln(5) =$$

$$\ln(5x) - \frac{1}{3}\ln(y) =$$

$$\ln(e^{3x}) =$$

$$e^{x\ln(5)} =$$

Exercise: Find all solutions to the equation: $\ln(2x^2) = 10$.

Trigonometric functions.

Given a right triangle with an angle θ , adjacent side of length a , opposite side of length o and hypotenuse of length h , we have

$$\sin(\theta) = \underline{\hspace{2cm}}, \quad \cos(\theta) = \underline{\hspace{2cm}}, \quad \tan(\theta) = \underline{\hspace{2cm}},$$

$$\sec(\theta) = \underline{\hspace{2cm}}, \quad \csc(\theta) = \underline{\hspace{2cm}}, \quad \cot(\theta) = \underline{\hspace{2cm}}.$$

In general, we allow arbitrary angle θ . Graphically, we have:

Some useful formulas:

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Exercise (standard values). Fill out the table below.

θ	0	$\pi/6$	$\pi/4$	$\pi/3$	$\pi/2$
$\sin(\theta)$					
$\cos(\theta)$					
$\tan(\theta)$					

Exercise: Given that θ is in the fourth quadrant and $\cos(\theta) = 4/5$, find the exact value of $\sec(\theta)$, $\sin(\theta)$ and $\tan(\theta)$.