

Lesson 0: Review

Exponential Rules

$$\textcircled{1} x^a x^b = x^{a+b}$$

$$\textcircled{2} \frac{x^a}{x^b} = x^{a-b}$$

$$\textcircled{3} (x^a)^b = x^{a \cdot b}$$

$$\textcircled{4} x^1 = x$$

$$\textcircled{5} x^0 = 1$$

$$\textcircled{6} x^{-1} = \frac{1}{x}$$

Logarithmic Rules

$$\textcircled{1} \ln 1 = 0$$

$$\textcircled{2} \ln(e^x) = x$$

$$\textcircled{3} e^{\ln x} = x$$

$$\textcircled{4} \ln(xy) = \ln x + \ln y$$

$$\textcircled{5} \ln\left(\frac{x}{y}\right) = \ln x - \ln y$$

$$\textcircled{6} \ln(x^m) = m \ln x$$

Rational Powers

$$\textcircled{1} \sqrt{x} = x^{1/2}$$

$$\textcircled{2} \sqrt[3]{x} = x^{1/3}$$

$$\textcircled{3} \sqrt[q]{x^p} = x^{p/q}$$

Trigonometry

	0	$\pi/6$	$\pi/4$	$\pi/3$	$\pi/2$
sin	$0 = \frac{0}{2}$	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{4}}{2} = 1$
cos	$1 = \frac{\sqrt{4}}{2}$	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	$\frac{0}{2} = 0$

$$\tan \theta = \frac{\sin \theta}{\cos \theta}$$

$$\cot \theta = \frac{\cos \theta}{\sin \theta}$$

$$\csc \theta = \frac{1}{\sin \theta}$$

$$\sec \theta = \frac{1}{\cos \theta}$$

Optional Homework

① Simplify the following expressions

(a) $e^{13} e^{-16}$

(b) $e^{-6x} e^x$

(c) $e^{-5x} e^{-11}$

(d) $(e^x)^{18}$

(e) $\frac{e^{-3}}{e^{19}}$

② Simplify the following expressions

(a) $\ln(e)$

(b) $\ln(e^{4x})$

(c) $\ln(1)$

(d) $e^{\ln(11x)}$

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e $5 + \ln(|x|)$
 e

f $7 \ln(8)$
 e

g $12 - \ln(16x)$
 e

③ Solve the following equation for x . Remember to keep your answer exact.

$$\ln(x^2) = 16$$

④ Express as sums, differences, and multiples of basic logarithmic functions, such as $\ln(x)$ and $\ln(y)$.

a $\ln(x^2 y)$

b $\ln\left(\frac{w^3}{\sqrt{x^4}}\right)$

c $\ln\left(\frac{x^6 z^2}{y^2 w^{12}}\right)$

d $\ln\left(\frac{\sqrt{x^{12}}}{\sqrt{y^{24}}}\right)$

e $\ln\left(\frac{e^2}{\sqrt[5]{x^3}}\right)$