Homework Questions

(15) $\ln \frac{1}{e}$

$\log_e \frac{1}{e}$

$\log_e e^{-1}$

-1

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(6) $\log_6 \frac{1}{\sqrt[5]{36}}$

$\log_6 \frac{1}{\sqrt[5]{6^2}}$

$\log_6 \frac{1}{6^{\frac{2}{5}}}$

$\log_6 6^{-\frac{2}{5}}$

$-\frac{2}{5}$

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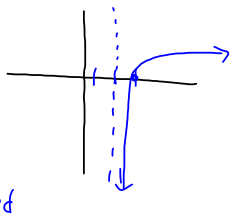
(53) $f(x) = \log(x-2)$

D: $(2, \infty)$
R: $(-\infty, \infty)$
cont: yes
inc: $(2, \infty)$
dec: never
bound: unbounded
ext max/min: none
symmetry: neither
VA: $x = 2$
HA: none
EB: $\lim_{x \to 2^+} f(x) = -\infty$
$\lim_{x \to \infty} f(x) = \infty$



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(36) $\log_{10} x = -3$

$10^{-3} = x$

$.001 = x$

$\frac{1}{1000}$

(21)

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3.4 Log Properties Notes

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- Product Rule
- Quotient Rule
- Power Rule
- Change of Base

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Product Rule:

only one log	multiple logs
Condensed	Expanded
$\log_b RS$	$\log_b R + \log_b S$
$\log_5 6x$	$\log_5 6 + \log_5 x$
$\log_2 xyz$	$\log_2 x + \log_2 y + \log_2 z$

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Quotient Rule:

Condensed	Expanded
$\log_b \frac{R}{S}$	$\log_b R - \log_b S$
$\log_b \frac{7}{y}$	$\log_b 7 - \log_b y$
$\log_3 \frac{m}{2}$	$\log_3 m - \log_3 2$

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Power Rule: In a condensed form there are powers In an expanded form not powers

Condensed	Expanded
$\log_b R^c$	$c \log_b R$
$\log_3 x^2 y^5$	$\log_3 x^2 + \log_3 y^5$ $2\log_3 x + 5\log_3 y$

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Write as multiple logarithms

Ex 1: $\log 8xy^4$

$\log 2^3 + \log x + \log y^4$

$3\log 2 + \log x + 4\log y$

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Expand and write as multiple logarithms

Ex. 2: $\ln \frac{\sqrt{x^2+5}}{x}$

$\ln \sqrt{x^2+5} - \ln x$

$\ln (x^2+5)^{\frac{1}{2}} - \ln x$

$\frac{1}{2} \ln (x^2+5) - \ln x$

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Rewrite as one logarithm

Ex. 3: $\ln x^5 - 2\ln xy$

$\ln x^5 - \ln (xy)^2$

$\ln \frac{x^{5-2}}{x^2y^2}$ x^2y^2

~~xxxxxx~~ xxx

$\ln \frac{x^3}{y^2}$

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Change of base:

$\log_8 2$ $\frac{\log_{10} 2}{\log_{10} 8}$ .333 $\frac{1}{3}$

remember the $\log_{10}$ base goes on the bottom pair-bottom

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Ex. 4:
Evaluate:

$\log_5 12$

$$\frac{\log_{10} 12}{\log_{10} 5}$$

1.5440

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