Properties of Logarithms

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4.4 Properties of Logarithms PreCalc Unit 4 Day 5

Product Property: $\log_b mn =$

Quotient Property: $\log_b \frac{m}{n} =$

Power Property: $\log_b m^p =$

Root Property: $\log_b \sqrt[p]{n} =$

Remember: $\log_e m = \ln m$
$\log_{10} m = \log m$

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Express in terms of sums and differences of logs:

1. $\ln x^3\sqrt{y}$
2. $\log_3 \sqrt[3]{\frac{x^2y}{z}}$
3. $\log\left(\frac{a^2}{3b^4}\right)^3$
4. $\ln\left(\frac{xy}{z^3}\right)$

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Write as a single log:

1. $\log(2x+7) + \log(x-1)$
2. $2\ln(x-3) - \ln(x^2-9)$
3. $\log a + \frac{1}{2}(\log b - \log c)$
4. $2 - \log(10x)$

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5. $2\ln(x-5) + \ln x$

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

$= \ln(x-5)(x-5)\cdot x$

$= \ln(x^2-10x+25)x$

$= \ln x^3 - 10x^2 + 25x$

6. $\ln e^{5x}$

$= 5x \ln e^1$

$= 5x$

$\log_e e = 1$

$\ln e = 1$

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7. Graph $y = \ln x$. Find domain, range and intercepts.

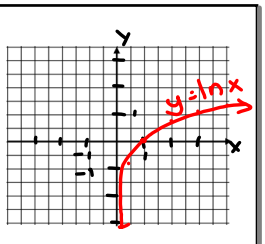
x	$\frac{1}{2}$	1	2	3	4
y	-.7	0	.7	1.1	1.4

D: $(0, \infty)$

R: $(-\infty, \infty)$

x-intercept(s): $(1, 0)$

y-intercept(s): none



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8. Graph $y = \ln(x+1)$. Find domain, range, and intercepts.

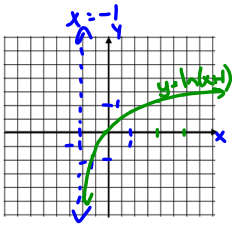
x	-½	0	1	2	3
y	-.7	0	.7	1.1	1.4

D: $(-1,\infty)$

R: $(-\infty,\infty)$

x-intercept(s): $(0,0)$

y-intercept(s): $(0,0)$



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9. Name the transformation that takes place from $y = \ln x$ to

a. $y = \ln x + 3$ up 3

b. $y = \ln(x+3)$ left 3

c. $y = \ln(-x)$ reflection over y-axis

$y = -\ln x$ r x axis

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10. Let $a = \ln x$, $b = \ln y$ and $c = \ln 2$. Find each of the following in terms of a, b, & c:

a. $\ln\left(\frac{x^2y^2}{2}\right)$

$= \ln x^2 + \ln y^2 - \ln 2$

$= 2\ln x + 2\ln y - \ln 2$

$= 2a + 2b - c$

b. $\ln(\sqrt[3]{xy})$

$= \ln(xy)^{1/3}$

$= \frac{1}{3}(\ln xy)$

$= \frac{1}{3}\ln x + \frac{1}{3}\ln y$

$= \frac{1}{3}a + \frac{1}{3}b$

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1. _____ 2. _____ 3. _____ 4. _____ 5. _____

6. _____ 7. _____ 8. _____ 9. _____ 10. _____

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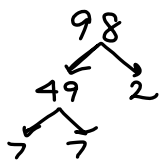
$\log_9 98$

$\log_9(7 \cdot 7 \cdot 2)$



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