Section 7-6
Natural Logarithms

Students will be able to:
- -evaluate and simplify natural log expressions
- -solve equations using natural logs

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We said that the natural exponential function has a base *e*.

$y = e^x$

The inverse of this function is the natural logarithm
$y = \log_e x$ or $y = \ln x$

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What is ln 7 + 2 ln 5 written as a single natural log?

$\ln 7 + 2\ln 5$

$\ln 7 + \ln 5^2$

$\ln 7(25) = \ln 175$

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The inverse relationship will be useful when solving natural log equations.

Solve:

$\ln (3x + 5)^2 = 4$

$\sqrt{e^4} = \sqrt{(3x+5)^2}$

$\pm\sqrt{e^4} = 3x + 5$

$\pm 7.389 = 3x + 5$

$-12.389 = 3x$, $-4.13 = \frac{3x}{3}$

$2.389 = 3x$, $.796 = \frac{3x}{3}$

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Solve:

$e^{3x} + 5 = 15$

$-5 \quad -5$

$\ln e^{3x} = \ln 10$

$\frac{3x}{3} = \frac{(\ln 10)}{3} \approx .767$

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pg. 481
#15. $\frac{1}{3}(\ln x + \ln y) - 4 \ln z$

$\frac{1}{3}(\ln xy) - \ln z^4$

$\ln (xy)^{1/3} - \ln z^4$

$\ln \frac{(xy)^{1/3}}{z^4} = \ln \frac{\sqrt[3]{xy}}{z^4}$

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Solve:

#24. $\ln \frac{x-1}{2} = 4$

$2e^4 = \frac{x-1}{2} + 1$

$x = 2e^4 + 1 \approx 110.$

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Solve:

#33. $e^{x+1} = 30$

$\ln e^{x+1} = \ln 30$

$x + 1 = \ln 30$

$x = \ln 30 - 1$

≈ 2.401

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Simplify:

#50. $\ln e^3$

3

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Hwk: pg. 481 - 482
#12 - 36 (4th), 38,
42 - 50 evens, 55, 56, 58, 62

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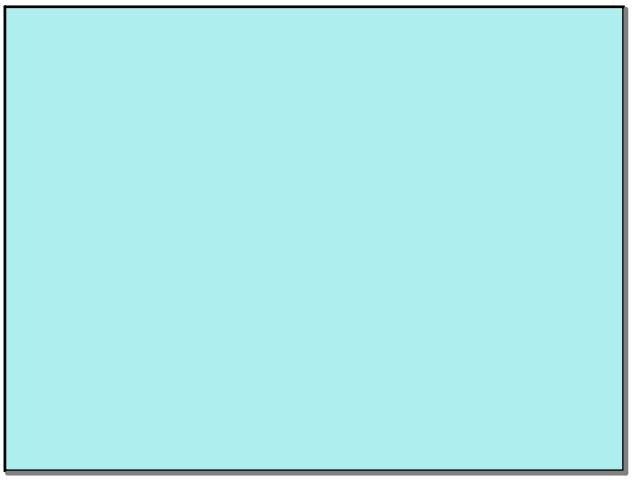

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