$\ln e^8 = 8$

$\ln e^8 = \log_e(e^8)$

$e^n = e^8$

$\ln e^{17} = 17$

$\ln e^{-6} = -6$

$\ln e^x = x$

$\ln e^{3x-9} = 3x-9$

$e^{\ln 3} = 3$

$e^{\ln 12} = 12$

$e^{\ln x} = x$

$e^{\ln(2x+5)} = 2x+5$

Since the natural base function and the natural logarithmic function are inverses, these two functions can be used to “undo” each other.

$$e^{\ln x} = x \qquad\qquad \ln e^{x} = x$$

For example $e^{\ln 7} = 7$ and $\ln e^{4x+3} = 4x+3$.

1. $5e^{-x} - 7 = 2$

$5e^{-x} = 9$

$e^{-x} = \frac{9}{5}$

$\ln e^{-x} = \ln \frac{9}{5}$

$-x = \ln \frac{9}{5}$

log form

$\ln \frac{9}{5} = -x$

$-\ln \frac{9}{5} = x$

exact $x = -\ln \frac{9}{5}$

$x \approx -.5878$

2. $3e^{x} + 2 = 4$

$3e^{x} = 2$

$e^{x} = \frac{2}{3}$

$\ln e^{x} = \ln \frac{2}{3}$

$x = \ln \frac{2}{3}$

log form

$\ln \frac{2}{3} = x$

$x \approx -.4055$

3. $\ln 5x = 4$

$e^{\ln 5x} = e^{4}$

$5x = e^{4}$

exact $x = \frac{e^{4}}{5}$

exp. form

$e^{4} = 5x$

$\frac{e^{4}}{5} = x$

$x \approx 10.9196$

4. $\ln(x-1) = -2$

$e^{\ln(x-1)} = e^{-2}$

$x - 1 = e^{-2}$

exp. form

$e^{-2} = x - 1$

exact $x = e^{-2} + 1$

$x \approx$

When interest is compounded continuously, the amount A in an account after t years is found using the formula $A = Pe^{rt}$, where P is the amount of principal and r is the annual interest rate (as a decimal).

Suppose you deposit \$1000 in an account paying 2.5% annual interest, compounded continuously, what is the balance after 10 years? 15 years?

$$A = Pe^{rt}$$

$$A = 1000e^{.025(10)}$$

1000e^(.025(10))

$$A = \$1284.03$$

$$A = 1000e^{.025(15)}$$

$$= \$1454.99$$

9.5 wkst → due tomorrow

Midterms → due Thursday (5pts.)