Natural Log Notes

- Common Log is log base 10
- Natural log is log base e

$\log_e x$ is written as $\ln x$

means natural log

* $\ln e = 1$
- based on $\log_e e = ?$

e to what power = e

power must be 1

$\therefore \ln e = 1$

Using Natural log

- we use natural log for the same purpose as common log; to solve equations where the base cannot be the same

Ex: $2^x = 9$

$\ln 2^x = \ln 9$

$x \ln 2 = \ln 9$

$\frac{x \ln 2}{\ln 2} = \frac{\ln 9}{\ln 2}$

$x = 3.17$

* the only circumstance that ln must be used is if e is in the equation.

Ex: $e^x = 4$

$\ln e^x = \ln 4$

$x \ln e = \ln 4$

$\ln e = 1$

$x = \ln 4$

$x = 1.386$

Ex: $e^{x-4} = 3^{x+1}$

$\ln e^{x-4} = \ln 3^{x+1}$

$(x-4)\ln e = (x+1)\ln 3$

$\ln e = 1$

$x - 4 = (x+1)\,1.099$

$x - 4 = 1.099x + 1.099$

$-5.099 = .099x$

$x = -51.505$