6.4 NOTES
Logarithms

$4^x = 16$ $\quad$ $2^x = 7$

$x = 2$

$4^x = 4^2$

$x = 2$

$2^{2x} = 2^4$

$2x = 4$

$x = 2$

REWRITE: $3^2 = 9$

exponential

$\log_3 9 = 2$

bump

logarithmic

$b^x = n \rightarrow \log_b n = x$

exp. log.

CHANGE OF BASE FORMULA

$$\log_3 9 = \frac{\log 9}{\log 3} = 2$$

$2^x = 7$

Rewrite: $\log_2 7 = x$

exact → $\frac{\log 7}{\log 2} = x$

$2.81 \approx x$

approx.

ex Rewrite as a Log

$1.2^3 = m$

$\log_{1.2} m = 3$

ex $e^b = 9$

$\log_e 9 = b$

$2.2 \approx b$

$\log_e = \ln$

$\ln 9 = b$

Common Log: If no base is given, the base is 10.

$\log 3$ ..... $\log_{10} 3$

$\log 10$ ... $\log_{10} 10$

1

"Natural Log": "ln"

$\ln 3$ .... $\log_e 3$

ex Evaluate

$\log_2 16 = x$

$2^x = 16$

$\log_2 2^4$

4

$2^x = 2^4$

$x = 4$

(4)

ex $\log_3 \frac{1}{27}$

$\log_3 \frac{1}{27} \rightarrow 3^x = \frac{1}{27}$

$3^x = \frac{1}{3^3}$

$3^x = 3^{-3}$

-3

ex $\ln \sqrt{e}$

$\ln e^{\frac{1}{2}}$

$\frac{1}{2}$

$\log_e e^{\frac{1}{2}}$

$\frac{1}{2}$

Solve: $\log_3(4x-7) = 2$

$x = 4$

$3^2 = 4x - 7$

$\log_3(9) = 2$

Solve: $\log_x 64 = 2$

$x^2 = 64$

$x = \pm 8$

Solve: $\log_6 36 = 5x+3$

$$6^{5x+3} = 36$$

$$6^{5x+3} = 6^2$$

Solve: $\ln e^{-2x} = \ln \frac{1}{3}$

exact answer $\frac{\log_e \frac{1}{3}}{-2} = \frac{-2x}{-2}$

$\frac{-2x}{-2} = \frac{\ln \frac{1}{3}}{-2}$

Approx. $x = .55$