

NOTES 4.4 - EVALUATING LOGARITHMS AND THE CHANGE-OF-BASE THEOREM

COMMON LOGARITHM

For all positive numbers x ,

$$\log x = \log_{10} x$$

NATURAL LOGARITHM

For all positive numbers x , $\ln x = \log_e x$

CHANGE-OF-BASE THEOREM

For any positive real numbers x , a , and b , where $a \neq 1$ and $b \neq 1$:

$$\log_a x = \frac{\log_b x}{\log_b a}$$

EXAMPLES -

1. Use a calculator to find an approximation to four decimal places for each expression.

a) $\log 25$

b) $\log .084$

c) $\ln 43$

d) $\ln .0062$

e) $\log(2.0 \times 10^{-4})$

f) $\ln(8 \times e^5)$

2. Use the change-of-base theorem to find an approximation to four decimal places for each logarithm.

a) $\log_4 20$

b) $\log_2 (.7)$