9.2 Logarithmic Functions

$f(x) = \log_a x$ → logarithmic function with base a.

Furthermore, $y = \log_a x$ if and only if

$x = a^y$

Convert to logarithmic form:

$x = a^y$

Ex: $2^4 = 16$

$y = \log_a x$

$16 = \log_2 4$

Ex: $4^{\frac{1}{2}} = 7$

$y = \log_a x$

$7 = \log_{4} \frac{1}{2}$

Convert to Exponential Form:

Ex: $\log_4 64 = 3$ $\quad y = \log_a x$

$a^y = x$

$4^3 = 64$

Ex: $-1 = \log_3 \frac{1}{3}$

$a^y = x$

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

Evaluating logs

- Change to exponential form.

Evaluate:

$\log_3 27$

$a^y = x$

$3^y = 27$

$y = 3$

Ex: $\log_2 2$

$a^y = x$

$2^y = 2$

1

$\log_5 1$

$5^y = 1$

0

Ex: $\log_4 0$

$4^y = 0$

N.S

Natural logarithmic Function

$f(x) = \log_e x = \boxed{\ln x}$

Ex: Evaluate $\ln 7 = 1.95$

Ex: $\log_{10} 5$

To evaluate any log, we use the change of base formula:

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

Ex: $\log_4 9 = \frac{\ln 9}{\ln 4} = 1.58$

p. 604

2-50, 78-82, 102-112

evens