

Algebra 5.3 Log Functions

Def of \log_a : $\log_a x = y$ same as $a^y = x$

log form - $\log_2 8 = y$ exponential form - $2^y = 8$

Change the following to exponential form

1) $\log_5 125 = x$ $5^x = 125$

2) $\log_3 x = 2$ $3^2 = x$

3) $\log_a 16 = 2$ $a^2 = 16$

Change the following to log form

1) $x^3 = 64$ $\log_x 64 = 3$

2) $10^5 = 100,000$ $\log_{10} 100,000 = 5$ or $\log 100,000 = 5$

3) $e^y = 2$ $\log_e 2 = y$ or $\ln 2 = y$ (natural log)

Change the following to exponential form

1) $\log 100 = 2$ $\log_{10} 100 = 2$ $10^2 = 100$

2) $\ln x = 5$ $\log_e x = 5$ $e^5 = x$

3) $\ln 3 = x - 1$ $\log_e 3 = x - 1$ $e^{x-1} = 3$

$\ln e = 1$ always replace $\ln e$ with 1

$\ln 1 = 0$ always replace $\ln 1$ with 0, same as $e^0 = 1$

$\log 10 = 1$ always replace $\log 10$ with 1

$\log_a 1 = 0$

Alg 5.3

Solve the following

① $\log_3 81$

$$\log_3 81 = y$$

$$3^y = 81$$

$$y = 4$$

② $\log_{10} 10^{-7}$

$$\log_{10} 10^{-7}$$

$$10^y = 10^{-7}$$

$$y = -7$$

③ $\log_x 64 = 3$

$$x^3 = 64$$

$$x = 4$$

④ $\log_x \frac{1}{64} = 3$

$$x^3 = \frac{1}{64}$$

$$x = \frac{1}{4}$$

⑤ $\log_3 \frac{1}{27}$

$$\log_3 \frac{1}{27} = y$$

$$3^y = \frac{1}{27}$$

$$y = -3$$

⑥ $\ln e^4$

$$\ln e^4 = y$$

$$e^y = e^4$$

$$y = 4$$

Solve for t

$$3a^{t/2} = 10$$

$$a^{t/2} = \frac{10}{3} \quad (\text{change to log form})$$

$$\log_a \frac{10}{3} = \frac{t}{2}$$

$$2 \log_a \frac{10}{3} = t \quad (\text{for i/rn } 2 * \log(a, \frac{10}{3}))$$

Solve for x.

$$4 \cdot 3^{x-2} = 16$$

$$3^{x-2} = 4 \quad (\text{change to log form})$$

$$\log_3 4 = x - 2$$

$$x = 2 + \log_3 4$$

Alg 5.3

Solve for x

$$\log_3(x-7)=2$$

$$3^2 = x-7$$

$$9+7=x$$

$$x=16$$

Solve for x

$$\log_7 x = \log_7(6-x)$$

$$x=6-x$$

$$2x=6$$

$$x=3$$

Solve for x

$$\log x^2 = -8$$

$$10^{-8} = x^2$$

$$\left(\frac{1}{10}\right)^8 = x^2$$

$$\pm \left(\frac{1}{10}\right)^4 = x \quad (\text{for ikrn } .0001, -.0001)$$

Find $\log_4 8$

$$\log_4 8 = y$$

$$4^y = 8$$

$$(2^2)^y = 2^3$$

$$2^{2y} = 2^3$$

$$2y = 3$$

$$y = \frac{3}{2}$$