1.) $\log_9\left(\frac{a^5 b^2}{c^4 d^3}\right) = \log_9 a^5 + \log_9 b^2 - \log_9 c^4 - \log_9 d^3$

$5\log_9 a + 2\log_9 b - 4\log_9 c - 3\log_9 d$

2.) $3\log_5 x - 9\log_5 y - 7\log_5 z$

$\log_5 \frac{x^3}{y^9 z^7}$

3.) $\ln\left(\frac{\sqrt[3]{x^2+4}}{(\sqrt{x^2-3})(x-1)}\right)$

$\ln(x^2+4)^{\frac{1}{3}} - \ln(x^2-3)^{\frac{1}{2}} - \ln(x-1)$

$\frac{1}{3}\ln(x^2+4) - \frac{1}{2}\ln(x^2-3) - \ln(x-1)$

$$\log_3(-5x) + \log_3 5 = 4$$

$$\log_3(-5x)(5) = 4$$

$$\log_3(-25x) = 4$$

exponential form

$$3^4 = -25x$$

$$\frac{81}{-25} = \frac{-25x}{-25}$$

$$x = -\frac{81}{25}$$

Remember:

logs are exponents

$a^5 * a^4 = a^{5+4}$

$\oplus \rightarrow$ mult.

$\ominus \rightarrow$ Div.

$$\log_2(x+5) - \log_2 x = 5$$

Divide

option #1 $x \neq 0$

$$x(32) = \left(\frac{x+5}{x}\right)x$$

$$32x = x + 5$$

$$-x \quad -x$$

$$\frac{31x}{31} = \frac{5}{31}$$

$$x = \frac{5}{31}$$

$$\log_2 \frac{(x+5)}{x} = 5$$

$$2^5 = \frac{x+5}{x}$$

$$32 = \frac{x+5}{x}$$

option #2

$$32 = \frac{x+5}{x}$$

$$32 = \frac{x}{x} + \frac{5}{x}$$

$$32 = 1 + \frac{5}{x}$$

$$-1 \quad -1$$

$$31 = \frac{5}{x}$$

$$x = \frac{5}{31}$$

$$\log_7 6 - \log_7 (x-2) = \log_7 25$$

$$\log_7 \frac{6}{x-2} = \log_7 25$$

$$\frac{6}{x-2} = 25$$

$x \neq 2$

$$\frac{6}{25} = x - 2$$

$+2 \qquad +2$

$$x = 2 + \frac{6}{25} \qquad 2 = \frac{50}{25}$$

$$\frac{56}{25} + \frac{6}{25} = \frac{56}{25} = 2.24$$

$$\frac{x-5}{2} = \frac{8}{2}$$

$$x - 5 = 8$$

$$\frac{12}{4} = 3$$

$$\frac{12}{3} = 4$$

$$\frac{1.8 * 12^{4x-8}}{1.8} = \frac{36}{1.8}$$

$$\log\left(12^{4x-8}\right) = \log(20)$$

$$\log 12^{4x-8} = \log 20$$

$$\frac{(4x-8)\log 12}{\log 12} = \frac{\log 20}{\log 12}$$

$$4x - 8 = \frac{\log 20}{\log 12}$$

$$+8 \qquad +8$$

$$\frac{4x}{4} = \frac{\frac{\log 20}{\log 12} + 8}{4}$$

$$x = \frac{\frac{\log 20}{\log 12} + 8}{4}$$

2.3

$$5^{10k-1} + 1 = 45$$

$$-1 \qquad -1$$

$$\log\left(5^{10k-1}\right) = \log(44)$$

$$\frac{(10k-1)(\log 5)}{\log 5} = \frac{\log 44}{\log 5}$$

$$10k - 1 = \frac{\log 44}{\log 5}$$

$$+1 \qquad +1$$

$$\frac{10k}{10} = \frac{\frac{\log 44}{\log 5} + 1}{10}$$

$$k = \frac{\frac{\log 44}{\log 5} + 1}{10} = 0.335$$

Graph $y = \log_{10} x$

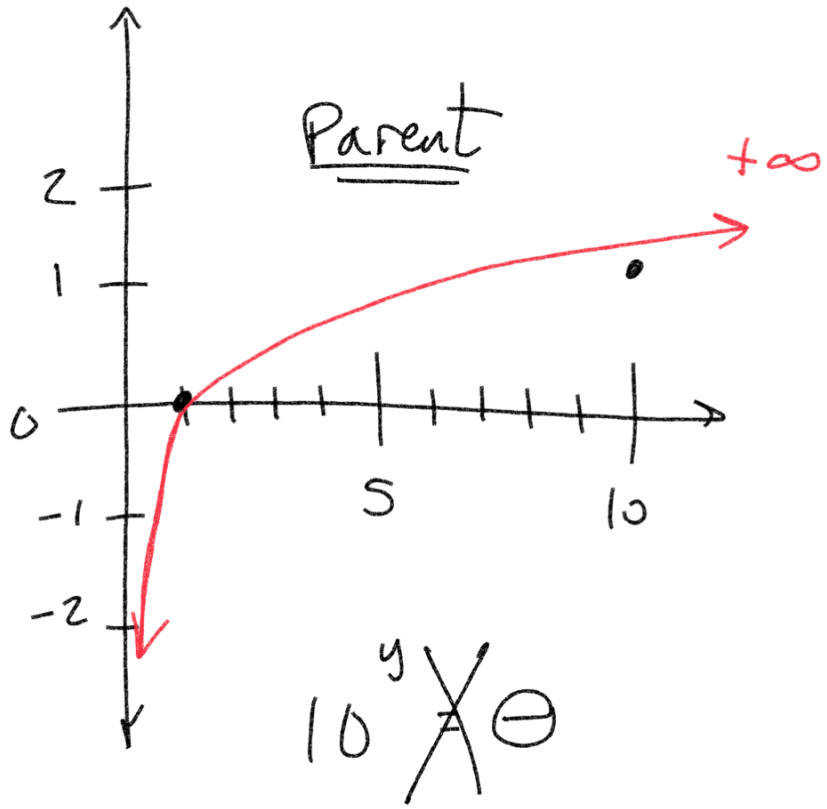
$\log_{10} x = y$

exponent form

$10^y = x$

$x = 1 \quad 10^0 = 1 \quad (1,0)$

$x = 10 \quad 10^1 = 10 \quad (10,1)$



$10^y \neq 0$

$\log_b(x+3) - 2$

left 3

down 2