

C12 - 8.2 - Log Restrictions Notes

State
Restrictions:

$$\log_b a \quad a > 0 \quad b > 0 \quad b \neq 1$$

$$\log x \quad x > 0$$

$$\log 0 = \text{und}$$

$$\log(-3) = \text{und}$$

$$\log_x \#$$

$$x > 0, x \neq 1$$

$$\log_0 \# = \text{und}$$

$$\log_{(-2)} \# = \text{und}$$

$$\log_1 \# = \text{und}$$

State Restrictions and Solve

Domain: Set the thing you are logging to greater than or equal to zero, then solve.

$$\begin{aligned} \log_2 x &= 2 \\ x &= 2^2 \\ x &= 4 \end{aligned}$$

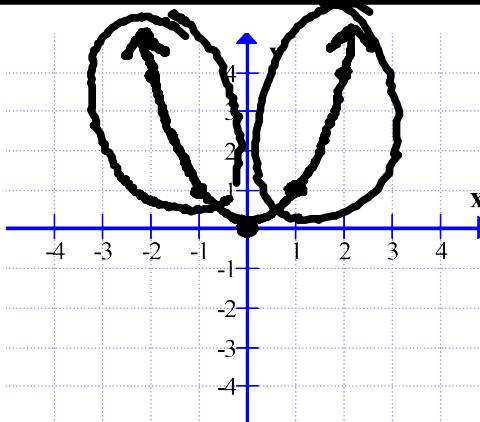
$$\begin{aligned} \log_2(x-5) &= 2 \\ x-5 &= 2^2 \\ x &= 4+5 \\ x &= 9 \end{aligned}$$

$$\begin{aligned} x-5 &> 0 \\ x &> 5 \end{aligned}$$

$$\begin{aligned} \log_2(3-x) &= 3 \\ (3-x) &= 2^3 \\ 3-x &= 8 \\ x &= -5 \end{aligned}$$

$$\begin{aligned} 3-x &> 0 \\ -x &< 3 \\ x &< 3 \end{aligned}$$

$$\begin{aligned} \log_3 x^2 &= 2 \\ x^2 &= 3^2 \\ x^2 &= 9 \\ \sqrt{x^2} &= \sqrt{9} \\ x &= \pm 3 \\ x &= 3, \quad x = -3 \end{aligned}$$



$$\begin{aligned} 2 \log_3 x &= 2 \\ \log_3 x &= 1 \\ x^2 &= 1 \\ x^2 &= 9 \\ \sqrt{x^2} &= \sqrt{9} \\ x &= \pm 3 \\ x &= 3, \quad x = -3 \end{aligned}$$

$$\begin{aligned} \log_{36}(5x-x^2) &= \frac{1}{2} \\ 5x-x^2 &= 36^{\frac{1}{2}} \\ 5x-x^2 &= 6 \\ x^2-5x+6 &= 0 \\ (x-2)(x-3) &= 0 \\ x &= 2, \quad x = 3 \end{aligned}$$

$$\begin{aligned} 5x-x^2 &> 0 \\ x(5-x) &> 0 \\ 0 &< x < 5 \end{aligned}$$

$$\begin{aligned} \log_9(x^2-1) &= \frac{1}{2} \\ x^2-1 &= 9^{\frac{1}{2}} \\ x^2-1 &= 3 \\ x^2-4 &= 0 \\ (x+2)(x-2) &= 0 \\ x &= -2, \quad x = 2 \end{aligned}$$

(x+1)(x-1) > 0

$$\begin{aligned} \log_{x-3} 16 &= 2 \\ 16 &= (x-3)^2 \\ 16 &= (x-3)(x-3) \\ 16 &= x^2 - 6x + 9 \\ 0 &= x^2 - 6x - 7 \\ 0 &= (x-7)(x+1) \\ x &= 7, \quad x = -1 \end{aligned}$$

$$\begin{aligned} x-3 &> 0 \\ x &> 3 \\ x-3 &\neq 1 \\ x &\neq 4 \end{aligned}$$

$$\begin{aligned} \log_3(-x) &= 2 \\ -x &= 3^2 \\ x &= -9 \end{aligned}$$

Set the base of the log > 0 and $\neq 1$ and solve.