

C12 - 8.2 - Log Restrictions Notes

State

Restrictions:

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

$$\log x$$

$$x > 0$$

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

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

$$\log_x \#$$

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

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

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

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

State Restrictions and Solve

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

$$\log_2 x = 2 \quad x > 0$$

$$x = 2^2$$

$$x = 4$$

$$\log_2(x - 5) = 2 \quad x - 5 > 0$$

$$x - 5 = 2^2$$

$$x = 4 + 5 \quad x > 5$$

$$x = 9$$

$$\log_2(3 - x) = 3 \quad 3 - x > 0$$

$$(3 - x) = 2^3 \quad -x < 3$$

$$3 - x = 8 \quad x < 3$$

$$x = -5$$

$$\log_3 x^2 = 2 \quad x^2 > 0$$

$$x^2 = 3^2 \quad x < 0, x > 0$$

$$x^2 = 9$$

$$\sqrt{x^2} = \sqrt{9} \quad x \neq 0$$

$$x = \pm 3$$

$$x = 3, x = -3$$

$$2 \log_3 x = 2 \quad x > 0$$

$$\log_3 x = 1$$

$$x^2 = 1$$

$$x^2 = 9$$

$$\sqrt{x^2} = \sqrt{9}$$

$$x = \pm 3$$

$$x = 3, x = -3$$

$$\log_{36}(5x - x^2) = \frac{1}{2}$$

$$5x - x^2 = 36^{\frac{1}{2}}$$

$$5x - x^2 = 6$$

$$x^2 - 5x + 6 = 0$$

$$(x - 2)(x - 3) = 0$$

$$0 < x < 5$$

$$x = 2, x = 3$$

$$\log_9(x^2 - 1) = \frac{1}{2}$$

$$x^2 - 1 > 0$$

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

$$x^2 - 1 = 9^{\frac{1}{2}}$$

$$x^2 - 1 = 3$$

$$x^2 - 4 = 0$$

$$(x + 2)(x - 2) = 0$$

$$x < -1, x > 1$$

$$x = -2, x = 2$$

$$\log_{x-3} 16 = 2$$

$$16 = (x - 3)^2$$

$$16 = (x - 3)(x - 3)$$

$$16 = x^2 - 6x + 9$$

$$0 = x^2 - 6x - 7$$

$$0 = (x - 7)(x + 1)$$

$$x = 7, x = -1$$

$$x - 3 > 0 \quad x - 3 \neq 1$$

$$x > 3 \quad x \neq 4$$

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

$$-x = 3^2$$

$$x = -9$$

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