

Warm-up!

Solve:

A)  $\log_2 x = 5$

B)  $4 \log_3 x = 8$

C)  $4 + \log_3 x = 2$

Log Functions Day 5:

- Quiz
- (2.13) Solving Log Equations

Homework: Solving Log Equations

## General approach to exponential equations

1. Isolate the logarithmic part
2. Use both sides as an exponent
3. Solve for  $x$  (distribute, rearrange, factor)
4. Check for extraneous solutions. (cannot do  $\log(\text{negative})$  )

Example A:

$$3 \log_2(x - 4) + 7 = 16$$

Example B+C

$$\frac{\ln(2x - 4) + 10}{7} = 2$$

$$\frac{1}{2}\log(5 - x) - 4 = -3$$

Example D+E

$$\log_3(12) - \log_3(2x) = 0 \text{ '}$$

$$\log_3(12) - \log_3(2x) = 1$$

## General approach to logarithmic equations

1. Get logs by themselves. This could potentially involve condensing logs with log properties.
2. Use both sides as an exponent.
3. Solve for  $x$  (distribute, rearrange, factor)
4. Check for extraneous solutions. (cannot do  $\log(\text{negative})$  )

Example F:  $\log_5(2x + 1) - \log_5(x - 3) = 1$

This is wrong. Do not do this. Every time you do this, a puppy forgets how to play fetch. And that's just sad.

$$\log_4(5) + \log_4(2x + 1) = \log_4(6x + 13)$$

$$\underset{4}{\log_4(5)} + \underset{4}{\log_4(2x + 1)} = \underset{4}{\log_4(6x + 13)}$$

$$5 + (2x + 1) = 6x + 13$$

Example G+H

$$\log_3(2x - 1) = 2 - \log_3(x - 2)$$

$$2 \log_3 x - \log_3(x - 1) = 2 \log_3 2$$

Example I+J

$$2 \log_4(3x + 2) = \log_4(x + 3) + 2$$

$$\log_2((x + 4)^3) = 2 \log_2(x + 4) + 3$$

Example K

Let  $f(x) = \ln(x - 1) + \ln(x + 3)$  and  $g(x) = \ln(2x + 13)$ .

Find all values of  $x$  where the graph of  $f$  and the graph of  $g$  intersect in the  $xy$ -plane.