

Solving Logarithmic Equations

- ① isolate the logarithmic term
→ this means you must condense into one single logarithm
- ② write equation in exponential form
- ③ solve for the variable

Examples:

① $\ln_e x = 8$ $e^8 = x$

log term (with arrow pointing to 8)

② $\log_2 (25-x) = 3$ $2^3 = 25-x$

log term (with arrow pointing to 3)

$$\begin{aligned} 8 &= 25 - x \\ -25 & \quad -25 \\ +17 &= +x \\ x &= 17 \end{aligned}$$

$$\textcircled{3} \log(x+2) + \log(x-1) = 1$$

$$\log[(x+2)(x-1)] = 1$$

$$\log(x^2 - x + 2x - 2) = 1$$

$$\log(x^2 + x - 2) = 1$$

$$10^1 = x^2 + x - 2$$

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

$$0 = (x+4)(x-3)$$

$$x+4=0$$

$$+4 -4$$

$$x \neq -4$$

$$x-3=0$$

$$+3 +3$$

$$x=3$$

$$\textcircled{4} \quad 2 \log x = \log 2 + \log(3x-4)$$

$$\log x^2 = \log [2(3x-4)]$$

$$\log x^2 = \log(6x-8)$$

equal

$$x^2 = 6x - 8$$

~~$-6x + 8$~~ ~~$-6x + 8$~~

$$x^2 - 6x + 8 = 0$$

$$(x-4)(x-2) = 0$$

$$x-4=0$$

~~$+4$~~ ~~$+4$~~

$$x-2=0$$

~~$+2$~~ ~~$+2$~~

$$x=4$$

$$x=2$$