

3.4 (part 2) Solving Log Eqns....

ex 1) $\log_3 x = 5 \rightarrow 3^5 = x \rightarrow x = 243$ (exp form)

ex 2) $\ln x = 8 \rightarrow$ "e both sides"
 $e^{\ln x} = e^8 \rightarrow x \approx 2980.96$

ex 3) $\log_4(x+5) + \log_4(x-1) = 2$

$\log_4[(x+5)(x-1)] = 2$

$4^2 = x^2 - x + 5x - 5$

$16 = x^2 + 4x - 5 \rightarrow 0 = x^2 + 4x - 21 \rightarrow (x+7)(x-3) = 0$

$\rightarrow x = -7$ or 3 ← Check solutions

$\log_4(-7+5) + \dots = \log_4(-2) + \dots$

cannot occur:
 $\log(\text{neg}) =$
 impossible

ex 4) $\log_3(x+6) + \log_3(x-6) - \log_3 x = 2$
 $x = -7$ or 3

$\log_3 \frac{(x+6)(x-6)}{x} = 2$ * Condense
 * exponent form

$3^2 = \frac{(x+6)(x-6)}{x} \rightarrow 9 = \frac{x^2-36}{x} \rightarrow 9x = x^2-36$

$\rightarrow 0 = x^2 - 9x - 36 \rightarrow (x+3)(x-12) = 0 \rightarrow x = -3$ or 12

ex 5) $2 \log x = \log 36$

$\log x^2 = \log 36 \rightarrow x^2 = 36 \rightarrow x = 6$ or -6

ex 6) $\log_2(7x-8) = \log_2(4x+2)$

$7x-8 = 4x+2 \rightarrow x = \frac{10}{3}$

$$\text{ex 7) } \ln(x-6) + \ln(x+1) = \ln(x-15)$$

*Condense

$$\ln[(x-6)(x+1)] = \ln(x-15)$$

FOIL

$$x^2 - 5x - 6 = x - 15$$

$$x^2 - 6x + 9 = 0 \rightarrow (x-3)(x-3) = 0$$

* e both sides

~~$x = 3$~~ (⚠)

no solution

$$\text{ex 8) } \ln(x-2) - \ln(x+1) = \ln(x-10) - \ln(x+3)$$

*condense

$$\ln \frac{x-2}{x+1} = \ln \frac{x-10}{x+3}$$

* e both sides

$$\frac{x-2}{x+1} = \frac{x-10}{x+3}$$

$$(x-2)(x+3) = (x-10)(x+1)$$

* FOIL

$$x^2 + x - 6 = x^2 - 9x - 10$$

$$10x = -4$$

~~$x = -\frac{2}{5}$~~ (⚠)

no solution

HW: p433, #50-90 even