Ch 8.4 Solving Equations Day 2

(E) $(\log_7 x)^2 - \log_7 x^2 - 3 = 0$

(C) $\log_x 4 - \log_x 2 + \log_x 8 = 2$

$\log_x\left(\frac{4}{2}\right) + \log_x 8 = 2$

$\log_x 2 + \log_x 8 = 2$

$\log_x(2 \cdot 8) = 2$

$\log_x(16) = 2$

Convert to exponential

$x^2 = 16$

$\sqrt{x^2} = \sqrt{16}$

$x = \pm 4$

base can not be negative ... reject $x = -4$

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

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

$\log_3[(2x-1)(x+1)] = 2$

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

$9 = 2x^2 + x - 1$

$0 = 2x^2 + x - 10$ $\quad -x- = 20$ $\quad -+- = 1$

$0 = \underbrace{2x^2 + 5x} - \underbrace{4x - 10}$

$0 = x(2x+5) - 2(2x+5)$

$0 = (2x+5)(x-2)$

$x = -\frac{5}{2} \qquad x = 2$

Check:

$x = 2$

$\log_3(2(2)-1)$ ok

$\log_3(2+1)$ ok

$x = -\frac{5}{2}$

$\log_3\left(2\left(-\frac{5}{2}\right)-1\right)$ NOT OK

reject $x = -\frac{5}{2}$

$$\frac{5(7^{2x})}{5} = \frac{0.815}{5}$$

$7^{2x} = 0.163$

convert to logs

$2x = \log_7(0.163)$

$x = \frac{1}{2} \cdot \log_7(0.163)$

exact answer

Approximate answer

$x = \frac{1}{2} \cdot \log_7(0.163)$

$= \frac{1}{2}\left(\frac{\log(0.163)}{\log(7)}\right)$

$= \frac{1}{2}(-0.9322142027)$

$= -0.4661071014$

$x \approx -0.47$

$$0.325^{x-1} = 0.826$$

$$\log(0.325^{x-1}) = \log(0.826)$$

$$\frac{(x-1)\cdot \log 0.325}{\log 0.325} = \frac{\log 0.826}{\log 0.325}$$

$$x-1 = \frac{\log 0.826}{\log 0.325}$$

$$x = \frac{\log 0.826}{\log 0.325} + 1$$

$x = 0.170082201 8 + 1$

$x = 1.170082201 8$

$x = 1.17$

7. Determine the value of x. Round your answers to two decimal places.

d) $4(7^{x+2}) = 9^{2x-3}$

$\log[4(7^{x+2})] = \log[9^{2x-3}]$

$\log 4 + \log(7^{x+2}) = (2x-3)\log 9$

$\log 4 + (x+2)\log 7 = (2x-3)\log 9$

$\log 4 + x\log 7 + 2\log 7 = 2x\log 9 - 3\log 9$

$\log 4 + 2\log 7 + 3\log 9 = 2x\log 9 - x\log 7$

$$\log 4 + 2\log 7 + 3\log 9 = 2x\log 9 - x\log 7$$

$$\log 4 + \log(7^2) + \log(9^3) = x\log(9^2) - x\log 7$$

$$\log 4 + \log 49 + \log 729 = x\log 81 - x\log 7$$

$$\log(4 \cdot 49 \cdot 729) = x(\log 81 - \log 7)$$

$$\frac{\log 142884}{\log\left(\frac{81}{7}\right)} = \frac{x\log\left(\frac{81}{7}\right)}{\log\left(\frac{81}{7}\right)}$$

$$x = \frac{\log 142884}{\log\left(\frac{81}{7}\right)} \approx 4.8477$$

$$\approx 4.85$$

d) $4(7^{x+2}) = 9^{2x-3}$

laws of exponents

$(4)(7^x)(7^2) = (9^{2x})(9^{-3})$

$(4 \cdot 49)(7^x) = (9^2)^x \left(\frac{1}{729}\right)$

$196(7^x) = \frac{81^x}{729}$

$(196 \cdot 729)7^x = 81^x$

$\frac{(142884)7^x}{7^x} = \frac{81^x}{7^x}$

$142884 = \frac{81^x}{7^x}$

$142884 = \left(\frac{81}{7}\right)^x$

Convert to logs

$x = \log_{\left(\frac{81}{7}\right)}(142884)$

$x = \frac{\log 142884}{\log\left(\frac{81}{7}\right)}$

hw: pg 413 # 7, 8, 20-22
c1, c4 ☺

PAY YOUR GRAD FEES