Solutions

I a. $\log_3 n - \log_3 4 = 2$

$\log_3\left(\frac{n}{4}\right) = 2 \rightarrow 3^2 = \frac{n}{4}$ $\boxed{n = 36}$

b. $\log 9x + \log x = 4$

$\log 9x^2 = 4 \rightarrow 10^4 = 9x^2 \quad x^2 = \frac{10000}{9}$

$x = \pm\sqrt{\frac{10000}{9}} = \pm\frac{100}{3}$ however $x = -\frac{100}{3}$ is extraneous

$\therefore \boxed{x = \frac{100}{3}}$

c. $\log_8(m+1) - \log_8(m) = \log_8 4$

$\log_8\left(\frac{m+1}{m}\right) = \log_8 4 \quad \therefore \quad \frac{m+1}{m} = 4$

$4m = m + 1 \qquad 3m = 1 \qquad \boxed{m = \frac{1}{3}}$

d. $10^{\log(x^2-1)} = 3 \rightarrow x^2 - 1 = 3 \quad x^2 = 4 \quad \boxed{x = \pm 2}$

$x = \pm 2$ both work!

e. $\log x + \log(x+21) = \log_5 25$

$\log(x(x+21)) = 2$

$\log(x^2 + 21x) = 2 \rightarrow 10^2 = x^2 + 21x$

$0 = x^2 + 21x - 100$

$0 = (x+25)(x-4)$

$x = -25$ extraneous or $\boxed{x = 4}$

f. $\log_6(y-3) + \log_6(y+2) = 1$

$\log_6[(y-3)(y+2)] = 1 \qquad \log_6(y^2 - y - 6) = 1$

$6^1 = y^2 - y - 6 \qquad 0 = y^2 - y - 12 \qquad 0 = (y-4)(y+3)$

$\boxed{y = 4}$ or $y = -3$ extraneous

g. $\log_3(2v-5) - \log_3(v^2+4v+4) = -2$

$\log_3\left(\frac{2v-5}{v^2+4v+4}\right) = -2 \qquad 3^{-2} = \frac{2v-5}{v^2+4v+4}$

$\frac{1}{9} = \frac{2v-5}{v^2+4v+4} \qquad v^2+4v+4 = 9(2v-5)$

$v^2+4v+4 = 18v - 45$

$v^2 - 14v + 49 = 0$

$(v-7)^2 = 0 \qquad \boxed{v = 7}$