§3.3 p 243 # 3-75 multiples of 3

(3) $\log_{1/5} x = \frac{\log x}{\log 1/5} = \frac{\ln x}{\ln 1/5}$

(6) $\log_x 3/4 = \frac{\log 3/4}{\log x} = \frac{\ln 3/4}{\ln x}$

(9) $\log_3 7 = \frac{\ln 7}{\ln 3} = 1.771$

(12) $\log_{1/4} 5 = \frac{\ln 5}{\ln 1/4} = -1.161$

(15) $\log_{15} 1250 = \frac{\ln 1250}{\ln 15} = 2.633$

(18) $\log_2(4^2 \cdot 3^4) = \log_2(4^2) + \log_2(3^4) = 2 + 4\log_2 3$

(21) $\ln(5e^6) = \ln 5 + \ln e^6 = \ln 5 + 6$

(24) $\log_5 \frac{1}{125} = \log_5 5^{-3} = -3$

(27) $\log_4 16^{1.2} = 1.2 \log_4 4^2 = (1.2)2 = 2.4$

(30) $\log_2(-16)$ NOT Possible (not in D)

(33) $\ln \frac{1}{\sqrt{e}} = \ln 1 - \ln \sqrt{e} = 0 - \frac{1}{2} = -\frac{1}{2}$

(36) $2\ln e^6 - \ln e^5 = 2 \cdot 6 - 5 = 7$

(39) $\log_4 5x = \log_4 5 + \log_4 x$

(42) $\log_{10} \frac{y}{z} = \log_{10} y - \log_{10} z = \log y - \log z$

(45) $\ln \sqrt{z} = \frac{1}{2} \ln z$

(48) $\log 4x^2y = \log 4 + 2\log x + \log y$

(51) $\log_a \frac{\sqrt{9-1}}{9}, a>1 = \frac{1}{2}\log_2(9-1) - \log_2 9 = \frac{1}{2}\log_2(9-1) - 2\log_2 3$

(54) $\ln\sqrt{\frac{x^2}{y^3}} = \frac{1}{2}\ln x^2 - \frac{1}{2}\ln y^3 = \ln x - \frac{3}{2}\ln y$

(57) $\log_5 \frac{x^2}{y^2z^3} = \log_5 x^2 - \log_5 y^2z^3 = 2\log_5 x - (\log_5 y^2 + \log_5 z^3)$

$= 2\log_5 x - 2\log_5 y - 3\log_5 z$

(60) $\ln\sqrt{x^2(x+2)} = \frac{1}{2}\ln x^2(x+2) = \frac{1}{2}\ln x^2 + \frac{1}{2}\ln(x+2)$

$= \ln x + \frac{1}{2}\ln(x+2)$

(63) $\log_4 z - \log_4 y = \log_4 \frac{z}{y}$

(66) $\frac{2}{3}\log_7(z-2) = \log_7(z-2)^{2/3}$

(69) $\ln x - 3\ln(x+1) = \ln \frac{x}{(x+1)^3}$

(72) $3\log_3 x + 4\log_3 y - 4\log_3 z = \log_3 \frac{x^3y^4}{z^4}$

(75) $\frac{1}{3}[2\ln(x+3) + \ln x - \ln(x^2-1)] = \frac{1}{3}[\ln(x+3)^2 + \ln x - \ln(x^2-1)]$

$= \frac{1}{3}\left[\ln \frac{(x+3)^2 x}{(x^2-1)}\right] = \ln\left(\frac{(x+3)^2 x}{(x^2-1)}\right)^{\frac{1}{3}}$

$= \ln \sqrt[3]{\frac{x(x+3)^2}{x^2-1}}$