SOLUTIONS
ASSIGNMENT #8
LOGARITHMS
NOV 5th '09
CONT'ED.

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#19 $\log_5\left(\frac{a^2b^3}{25}\right) = \log_5 a^2b^3 - \log_5 25$

$= \log_5 a^2 + \log_5 b^3 - 2$

$= \boxed{2\log_5 a + 3\log_5 b - 2}$

#20 $\log_b a^2 b^3\sqrt{c} = \log_b a^2 + \log_b b^3 + \log_b \sqrt{c}$

$= \boxed{2\log_b a + 3 + \frac{1}{2}\log_b c}$

#22 $\log\sqrt{\frac{a^2}{100b^3}} = \frac{1}{2}\log\left(\frac{a^2}{100b^3}\right)$

$= \frac{1}{2}\left(\log a^2 - \log 100b^3\right)$

$= \frac{1}{2}\left(2\log a - (\log 100 + \log b^3)\right)$

$= \frac{1}{2}\left(2\log a - 2 - 3\log b\right)$

$= \boxed{\log a - 1 - \frac{3}{2}\log b}$

#34 $5\ln x - 3\ln x - 2\ln\sqrt{x}$

$= 5\ln x - 3\ln x - 2\ln x^{1/2}$

$= 5\ln x - 3\ln x - \ln x$

$= \boxed{\ln x}$

#36 $\frac{1}{2}\log x + \frac{3}{2}\log 2y - \log x^2 y$

$= \log x^{1/2} + \log (2y)^{3/2} - \log x^2 y$

$= \log \left(x^{1/2} (2y)^{3/2} \right) - \log x^2 y$

$= \log \left(\frac{x^{1/2} 2^{3/2} y^{3/2}}{x^2 y} \right) = \boxed{\log \left(\frac{2^{3/2} y^{1/2}}{x^{3/2}} \right)}$

#93 $7^x = 101$

$\ln 7^x = \ln 101$

$x \ln 7 = \ln 101$

$\boxed{x = \frac{\ln 101}{\ln 7}}$

$= 2.37$

#105 $3(5^{x+1}) = 7^{1-x}$

$\ln (3 \cdot 5^{x+1}) = \ln 7^{1-x}$

$\ln 3 + \ln 5^{x+1} = (1-x) \ln 7$

$\ln 3 + (x+1) \ln 5 = (1-x) \ln 7$

$\ln 3 + x \ln 5 + \ln 5 = \ln 7 - x \ln 7$

$x \ln 5 + x \ln 7 = \ln 7 - \ln 3 - \ln 5$

$x (\ln 5 + \ln 7) = \ln 7 - \ln 3 - \ln 5$

$\boxed{x = \frac{\ln 7 - \ln 3 - \ln 5}{\ln 5 + \ln 7}}$

$= -0.214$

#111 $0.5 = 2^{-0.15x}$

$\ln 0.5 = \ln 2^{-0.15x}$

$\ln 0.5 = -0.15x \ln 2$

$x = \frac{\ln 0.5}{-0.15 \ln 2}$

$\boxed{x = 6.67}$