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#50) $\ln\left[\dfrac{5x^2\sqrt[3]{1-x}}{4(x+1)^2}\right]$, $0<x<1$

$\ln[5x^2(1-x)^{1/3}] - \ln[4(x+1)^2]$

$\ln(5x^2) + \ln(1-x)^{1/3} - [\ln 4 + \ln(x+1)^2]$

$\ln 5 + \ln x^2 + \frac{1}{3}\ln(1-x) - \ln 4 - \ln(x+1)^2$

$\ln 5 + 2\ln x + \frac{1}{3}\ln(1-x) - \ln 4 - 2\ln(x+1)$

#55) $\log_4(x^2-1) - 5\log_4(x+1)$

$\log_4(x^2-1) - \log_4(x+1)^5 = \log_4 \dfrac{(x+1)^5}{(x^2-1)}$

#60) $21\log_3\sqrt[3]{x} + \log_3(9x^2) - \log_3 9$

$21\log_3(x^{1/3}) + \log_3(9x^2) - \log_3 9$

$\log_3(x^{1/3})^{21} + \log_3(9x^2) - \log_3 9$

$\log_3 x^7 + \log_3(9x^2) - \log_3 9$

$\log_3(x^7 \cdot 9x^2) - \log_3 9$

$\log_3\left(\dfrac{9x^9}{9}\right) = \log_3 x^9 = 9\log_3 x$

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#65) $\log_3 21 = \frac{\ln 21}{\ln 3}$ or $\log_3 21 = \frac{\log 21}{\log 3} = 2.771$

#70) $\log_{\sqrt{5}} 8 = \frac{\ln 8}{\ln \sqrt{5}} = 2.584$

#75) $y = \log_2 (x+2)$

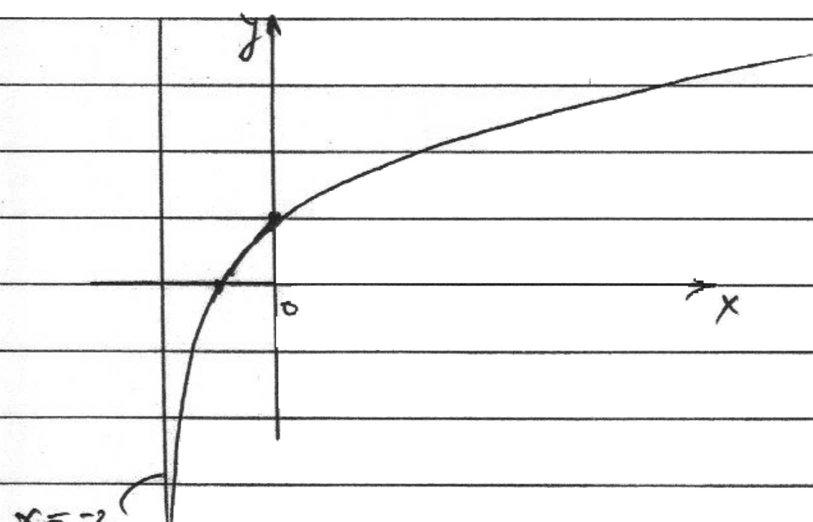
1. Domain: $x+2 > 0 \Rightarrow x > -2 \Rightarrow x \in (-2, +\infty)$

2. $x+2 = 1 \Rightarrow x = -1$, $(-1, 0)$

$x+2 = 2 \Rightarrow x = 0$ $(0, 1)$

3. As $x \to -2$, $y \to -\infty$; $x = -2$ is an asymptote

As $x \to +\infty$, $y \to +\infty$



#80) $\ln y = \ln (x+C)$

$\Rightarrow y = x + C$

Section 5.6

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#5) $2\log_5 x = 3\log_5 4$

$\log_5 x^2 = \log_5 4^3 \Longleftrightarrow x^2 = 4^3 = (2^2)^3 = 2^6$

$x = (2^6)^{1/2} = 2^3 = 8$

$\boxed{x = 8}$

#10) $\log_4 x + \log_4 (x-3) = 1$; D: $x > 0$, $x - 3 > 0 \Rightarrow x > 3$

$\log_4 x(x-3) = 1 \Longleftrightarrow x(x-3) = 4^1 = 4$

$x^2 - 3x - 4 = 0$

$(x-4)(x+1) = 0$

$x - 4 = 0$	$x + 1 = 0$
$x = 4$	$x = -1$ Not accepted because $x > 3$ from the above domain

∴ Solution Set $x = 4$.

#15) $3^{2x} + 3^{x+1} - 4 = 0$

let $z = 3^x \Rightarrow z^2 = (3^x)^2 = 3^{2x}$

$3^{x+1} = 3 \cdot 3^x = 3z$

$\Rightarrow z^2 + 3z - 4 = 0$

$(z+4)(z-1) = 0$

$z + 4 = 0$	$z - 1 = 0$
$z = 4$	$z = 1$

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#15) Continue #15

$z = -4 \implies 3^x = -4$ No Solution

$z = 1 \implies 3^x = 1 \implies \boxed{x = 0}$

$\therefore$ Sol. Set $x = \{0\}$

#20) $2^{-x} = 1.5$

$\ln 2^{-x} = \ln 1.5$

$-x \ln 2 = \ln 1.5 \implies x = \dfrac{\ln 1.5}{-\ln 2} = -.585$

Sol. Set $x = \{-.585\}$

#25) $1.2^x = (.5)^{-x}$

$\ln 1.2^x = \ln (.5)^{-x}$

$x \ln 1.2 = -x \ln(.5)$

$x(\ln 1.2 + \ln .5) = 0$

$\implies x \ln(1.2 \times .5) = 0 \quad ; \ln(1.2 \times .5) \neq 0$

$\implies \boxed{x = 0}$

#30) $0.3\left(4^{0.2x}\right) = 0.2$

$4^{0.2x} = \dfrac{0.2}{0.3} = \dfrac{2}{3}$

$\ln 4^{0.2x} = \ln(2/3)$

$0.2x \ln 4 = \ln(2/3)$

$x = \dfrac{\ln(2/3)}{(0.2 \ln 4)} = -1.462$

$\boxed{x = -1.462}$

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#39) $\log_2(x+1) - \log_4 x = 1$

$\frac{\ln(x+1)}{\ln 2} - \frac{\ln x}{\ln 4} = 1$; $\ln 4 = \ln 2^2 = 2\ln 2$

$\frac{\ln(x+1)}{\ln 2} - \frac{\ln x}{2\ln 2} = 1$; Multiply each side by $2\ln 2$

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

$\ln(x+1)^2 - \ln x = 2\ln 2$

$\ln\left(\frac{(x+1)^2}{x}\right) = \ln 2^2 = \ln 4$

$\Rightarrow \frac{(x+1)^2}{x} = 4$

$(x+1)^2 = 4x$

$x^2+2x+1 = 4x$

$x^2-2x+1 = 0$

$(x-1)^2 = 0 \Rightarrow x-1=0 \Rightarrow \boxed{x=1}$

#40) $\log_2 x^{\log_2 x} = 4$; Domain: $x > 0 \Rightarrow x \in (0, +\infty)$

$\Rightarrow \log_2 x \log_2 x = 4$

$[\log_2 x]^2 = 4$

$\log_2 x = \pm 2$

$\Rightarrow$ $\log_2 x = -2$ | $\log_2 x = 2$

$\Rightarrow x = 2^{-2} = \frac{1}{4}$ | $\Rightarrow x = 2^2 = 4$

$\therefore$ Sol. Set $x = \{1/4, 4\}$