Ch. 5 Logs Review:

1. Find f'(x) for f(x) = $\sqrt{\dfrac{(x+2)^3}{x\left(\sqrt[5]{2-7x}\right)}}$

2. Find $\frac{d^2y}{dx^2}$ for y = $x(5^{1-6x})$

3. Find dy/dx for f(x) = $3x^{(1-x)^2}$

4. f(x) = 3x + $9x^{13}$ Find $(f^{-1})'(-12)$

5. Derive the derivative for y = arcsec x implicitly.

6. Find dy/dx for y = $log_3\left(\frac{1-x}{2x^2}\right) - 5e^{2x^2-5x} + ln\left(\sqrt{(1-4x^2)^3}\right) - 9^{3-x-5x^2}$

7. Sketch the 6 Arc-trig graphs

Key

Ch. 5 Logs Review:

1. Find f'(x) for f(x) = $\sqrt{\frac{(x+2)^3}{x(\sqrt[5]{2-7x})}}$

$\ln y = \ln\left[\frac{(x+2)^3}{x(2-7x)^{1/5}}\right]^{1/2}$

$\ln y = \frac{1}{2}\ln(x+2)^3 - \frac{1}{2}\ln x - \frac{1}{2}\ln(2-7x)^{1/5}$

$\ln y = \frac{3}{2}\ln(x+2) - \frac{1}{2}\ln x - \frac{1}{10}\ln(2-7x)$

$\frac{1}{y}\frac{dy}{dx} = \frac{3}{2}\left(\frac{1}{x+2}\right) - \frac{1}{2}\left(\frac{1}{x}\right) - \frac{1}{10}\left(\frac{-7}{2-7x}\right)$

$\frac{dy}{dx} = \sqrt{\frac{(x+2)^3}{x(2-7x)^{1/5}}}\left[\frac{3}{2(x+2)} - \frac{1}{2x} + \frac{7}{10(2-7x)}\right]$

2. Find $\frac{d^2y}{dx^2}$ for y = $x(5^{1-6x})$

$\frac{dy}{dx} = 1 \cdot 5^{1-6x} + x \cdot \ln 5 \cdot 5^{(1-6x)} \cdot (-6) = 5^{(1-6x)} - 6x\ln 5(5)^{1-6x}$

$\frac{d^2y}{dx^2} = \ln 5 \cdot 5^{(1-6x)} \cdot (-6) - 6[\ln 5 \cdot 5^{1-6x}] - 6x \cdot \ln 5 \cdot \ln 5 \cdot 5^{1-6x} \cdot (-6)$

$= -6\ln 5 \cdot 5^{(1-6x)} - 6\ln 5 \cdot 5^{(1-6x)} + 36(\ln 5)^2 x \cdot 5^{1-6x}$

$\boxed{= -12\ln 5(5^{1-6x}) + 36(\ln 5)^2 x \cdot 5^{(1-6x)}}$

3. Find dy/dx for f(x) = $3x^{(1-x)^2}$

$y = 3x^{(1-x)^2}$

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

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

$\ln y = \ln 3 + (1-x)^2 \ln x$

$\frac{1}{y}\left(\frac{dy}{dx}\right) = 0 + 2(1-x)(-1)\ln x + (1-x)^2\left(\frac{1}{x}\right)$

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

$f'(x) = 3 + 117x^{12}$

$f'(-1) = 3 + 117 = 120$

4. f(x) = 3x + 9x^{13} Find $(f^{-1})'(-12)$

$-12 = 3x + 9x^{13}$

$x = -1$

$f(-1) = -12$	$(f^{-1})(-12) = -1$
$f'(-1) = \boxed{120}$	$(f^{-1})'(-12) = \boxed{\frac{1}{120}}$

5. Derive the derivative for y = arcsec x implicitly.

$\sec y = \sec(\operatorname{arcsec} x)$

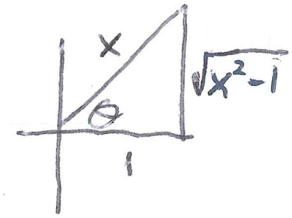
$\sec y = x$

$\left(\frac{dy}{dx}\right) \sec y \tan y = 1$

$\frac{dy}{dx} = \frac{1}{\sec y \tan y}$

$\frac{dy}{dx} = \frac{1}{\sec(\operatorname{arcsec} x) \cdot \tan(\operatorname{arcsec} x)}$

$\boxed{\frac{dy}{dx} = \frac{1}{|x|\sqrt{x^2-1}}}$



6. Find dy/dx for y = $\log_3\left(\frac{1-x}{2x^2}\right) - 5e^{2x^2-5x} + \ln\left(\sqrt{(1-4x^2)^3}\right) - 9^{3-x-5x^2}$

$y = \log_3(1-x) - \log_3(2x^2) - 5e^{2x^2-5x} + \frac{3}{2}\ln(1-4x^2) - 9^{(3-x-5x^2)}$

$y' = \frac{1}{\ln 3}\left(\frac{-1}{1-x}\right) - \frac{1}{\ln 3}\left(\frac{4x}{2x^2}\right) - 5e^{2x^2-5x}(4x-5) + \frac{3}{2}\left(\frac{-8x}{1-4x^2}\right) - \ln 9 \cdot 9^{3-x-5x^2}(-1-10x)$

$y' = \frac{-1}{\ln 3(1-x)} - \frac{4x}{(\ln 3)2x^2} - 5(4x-5)e^{2x^2-5x} - \frac{24x}{2(1-4x^2)} + (\ln 9)(1+10x)9^{(3-x-5x^2)}$

7. Sketch the 6 Arc-trig graphs