XRONOS HW 10 #1:

$\frac{d}{dx}\left(15\sin(-\pi x)\tan\left(\frac{2}{3}\pi x\right)\right)$

NOTE: $\frac{d}{dx}[15\sin(-\pi x)] = -15\pi\cos(-\pi x)$

$\frac{d}{dx}\left[\tan\left(\frac{2\pi}{3}x\right)\right] = \frac{2\pi}{3}\sec^2\left(\frac{2\pi}{3}x\right)$

$= \left[\frac{d}{dx}(15\sin(-\pi x))\right]\tan\left(\frac{2}{3}\pi x\right) + 15\sin(-\pi x)\left[\frac{d}{dx}\left(\tan\left(\frac{2}{3}\pi x\right)\right)\right]$

$= -15\pi\cos(-\pi x)\tan\left(\frac{2}{3}\pi x\right) + \overset{5}{\cancel{15}}\sin(-\pi x)\frac{2\pi}{3}\sec^2\left(\frac{2\pi}{3}x\right)$

$= -15\pi\cos(-\pi x)\tan\left(\frac{2}{3}\pi x\right) + 10\pi\sin(-\pi x)\sec^2\left(\frac{2\pi}{3}x\right)$

XRONOS HW 10 #10:

COMPUTE FIRST AND SECOND DERIVATIVE OF $f(x) = \cos(1/x)$

$f'(x) = \left[\frac{d}{dx}\left(\frac{1}{x}\right)\right]\left[-\sin\left(\frac{1}{x}\right)\right] = \left[\frac{d}{dx}(x^{-1})\right]\left[-\sin(1/x)\right] = -\frac{1}{x^2}(-\sin(1/x)) = \frac{1}{x^2}\sin\left(\frac{1}{x}\right)$

$\Rightarrow f'(x) = 1/x^2\sin(1/x)$

$f''(x) = \left[\frac{d}{dx}\left(\frac{1}{x^2}\right)\right](\sin(1/x)) + \left[\frac{d}{dx}\sin(1/x)\right]\left[1/x^2\right]$

$= -\frac{2}{x^3}\sin(1/x) + \left[\frac{d}{dx}\left(\frac{1}{x}\right)(\cos(1/x))\right]\left[\frac{1}{x^2}\right] = -\frac{2}{x^3}\sin(1/x) + \left(-\frac{1}{x^2}\cos(1/x)\left(\frac{1}{x^2}\right) = \boxed{-\frac{2}{x^3}\sin(1/x) - \frac{1}{x^4}\cos(1/x)}$

XRONOS HW 10 #14:

FIND $f'(x)$ FOR $f(x) = 4^{\sin^2(x)+\cos(3x)}$

$* \ \frac{d}{dx}[4^x] = 4^x\ln(4)$

$f'(x) = \left[\frac{d}{dx}(\sin^2(x)+\cos(3x))\right]\left[\left(4^{\sin^2(x)+\cos(3x)}\right)(\ln(4))\right]$

$* \ \frac{d}{dx}(\sin^2(x))$

$= \sin(x)\cos(x)+\cos(x)\sin(x)$

$= \left(\sin(x)\cos(x)+\cos(x)\sin(x) - 3\sin(3x)\right)\left(4^{\sin^2(x)+\cos(3x)}\right)(\ln(4))$

$= \boxed{\left(2\sin(x)\cos(x) - 3\sin(3x)\right)\left(4^{\sin^2(x)+\cos(3x)}\right)(\ln(4))}$

XRONOS HW 11 #5:

IMPLICITLY DERIVE $9x^2\sin(y)=xy$ AND SOLVE FOR $\frac{dy}{dx}$:

*PRODUCT RULE AND CHAIN RULE:

*INSIDE FUNCTION: y

*OUTSIDE FUNCTION (sin(y))

$\Rightarrow \underbrace{18x(\sin(y)) + 9x^2\cos(y)\frac{dy}{dx}}_{\text{PRODUCT RULE}} = \underbrace{y + x\left(\frac{dy}{dx}\right)}_{\text{PRODUCT RULE}}$

$\Rightarrow 18x\sin(y) - y = -9x^2\cos(y)\frac{dy}{dx} + x\frac{dy}{dx}$

$\Rightarrow 18x\sin(y) - y = \frac{dy}{dx}\left(-9x^2\cos(y) + x\right)$

$\Rightarrow \boxed{\frac{dy}{dx} = \frac{18x\sin(y) - y}{-9x^2\cos(y) + x}}$

XRONOS HW 11 #12:

$\frac{d}{dx}\left[-2\operatorname{arcsec}(x+1)\right] = -2\left[\frac{1}{|x+1|\sqrt{(x+1)^2-1}}\right]\left[\frac{d}{dx}(x+1)\right]$

$= \frac{-2}{|x+1|\sqrt{(x+1)^2-1}}$