$$\frac{d}{dx}e^x = e^x$$

Taylor series

$$\frac{d}{dx}e^x = 1 + x + \frac{1}{2}x^2 + \frac{1}{6}x^3 + \frac{1}{24}x^4 + \frac{1}{120}x^5 + \ldots$$

$$= 1 + x + \frac{1}{2}x^2 + \frac{1}{6}x^3 + \frac{1}{24}x^4 + \ldots$$

HW[10] #7)

$$f(x) = 2\sin(x)$$

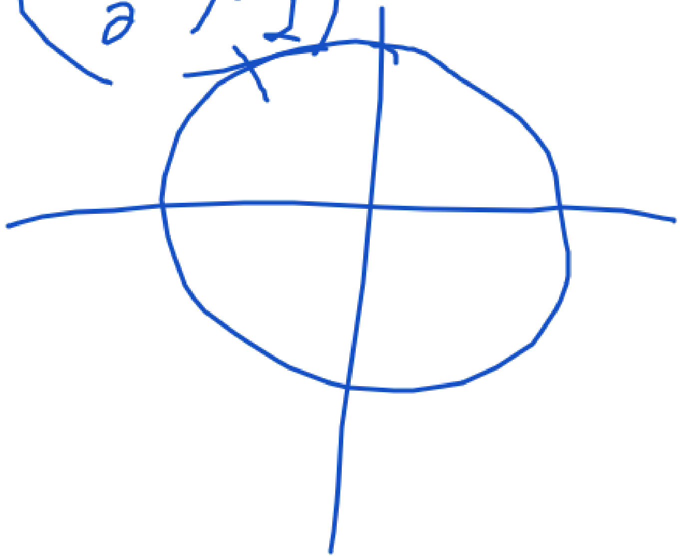
$$x = \frac{3\pi}{4}$$

$$y = 2\sin\left(\frac{3\pi}{4}\right)$$

$$f'(x) = 2\cos(x)$$

$$= 2\frac{\sqrt{2}}{2} = \sqrt{2}$$

$$\left(-\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2}\right)$$



$$\left(\frac{3\pi}{4}, \sqrt{2}\right)$$

$$f'\left(\frac{3\pi}{4}\right) = 2\cos\left(\frac{3\pi}{4}\right)$$

$$= \cancel{2}\left(\frac{-\sqrt{2}}{\cancel{2}}\right) = -\sqrt{2} = m$$

$$\boxed{y - \sqrt{2} = -\sqrt{2}\left[x - \frac{3\pi}{4}\right]}$$

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

$$y' = \left(\frac{d}{dx}e^{3x}\right)\sin^{-1}(3x-2) + e^{3x}\left(\frac{d}{dx}\sin^{-1}\underline{(3x-2)}\right)$$

$$\boxed{= 3e^{3x}\sin^{-1}(3x-2) + e^{3x}\left(\frac{3}{\sqrt{1-(3x-2)^2}}\right)}$$

$$\frac{d}{dx}\sin^{-1}(\star) = \frac{1}{\sqrt{1-(\star)^2}}\cdot(\star)'$$

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

$$\boxed{-9} = 3x^2y^3 + x\tan(y)$$

solve for $\frac{dy}{dx}$ (y')

$$0 = 3(2x)y^3 + 3(x^2)(3y^2)\frac{dy}{dx} + \tan(y) + x\sec^2(y)\frac{dy}{dx}$$

$$0 = 6xy^3 + 9x^2y^2\frac{dy}{dx} + \tan(y) + x\sec^2(y)\frac{dy}{dx}$$

$$-9x^2y^2\frac{dy}{dx} - x\sec^2 y\,\frac{dy}{dx} = 6xy^3 + \tan y$$

$$\frac{\boxed{\frac{dy}{dx}}\cancel{\left[-9x^2y^3 - x\sec^2 y\right]}}{\cancel{-9x^2y^2 - x\sec^2 y}} = \boxed{\frac{6xy^3 + \tan y}{-9x^2y^2 - x\sec^2 y}}$$

$$\boxed{y = x^{2\cos(3x)}}$$

solve for y'

$$\ln(y) = \ln\left(x^{2\cos(3x)}\right)$$

$$\ln(y) = 2\cos(3x)\ln(x)$$

$$\frac{1}{y} \cdot y' = 2(-3\sin(3x))\ln(x) + 2\cos(3x) \cdot \frac{1}{x}$$

$$\boxed{y' = \left[-6\sin(3x)\ln(x) + \frac{2\cos(3x)}{x}\right] \underbrace{x^{2\cos(3x)}}_{y}}$$

$$\sqrt{\frac{x+1}{x^2-1}} \rightarrow \ln\left(\left(\frac{x+1}{x^2-1}\right)^{1/2}\right) = \frac{1}{2}\ln\left(\frac{x+1}{x^2-1}\right)$$

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

$$\ln(x^a) = a\ln(x)$$

$$\ln(xy) = \ln(x) + \ln(y)$$

$$\ln\left(\frac{x}{y}\right) = \ln(x) - \ln(y)$$