26. $f(x)=\dfrac{x^3+3x+2}{x^2-1}$

Note: as a product, $f(x)=(x^3+3x+2)(x^2-1)^{-1}$
we don't know how to differentiate this yet
so we have to use the quotient rule!

$$f'(x)=\frac{\overbrace{(x^2-1)}^{\text{low}}\overbrace{(3x^2+3)}^{\text{dee high}}\overbrace{-}^{\text{less}}\overbrace{(x^3+3x+2)}^{\text{high}}\overbrace{(2x)}^{\text{dee low}}}{(x^2-1)^2}$$

draw the line

Square below

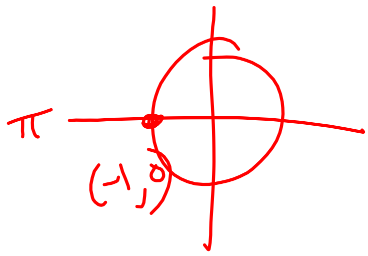
If we have to simplify...

$$f(x)=\frac{\cancel{3x^4}+\cancel{3x^2}-\cancel{3x^2}-3-\cancel{2x^4}-6x^2-4x}{(x^2-1)^2}$$

$$=\frac{x^4-6x^2-4x-3}{(x^2-1)^2}=\boxed{\frac{x^4-6x^2-4x-3}{x^4-2x^2+1}}$$

Find the slope of the tangent line

$f(x)=3x-\sin x \quad ; (\pi, 3\pi)$



$f'(x)=3-\cos x$

$m=f'(\pi)=3-\cos\pi$

$=3-(-1)=\boxed{4}$

$y-3\pi=(\cancel{3-\cos x}\ 4)(x-\pi)$

Find the equation of the tangent line.

$f(x) = 2x^3 + \sin x - 2x \quad ; \ (0,0)$

$f'(x) = 6x^2 + \cos x - 2$

$m = f'(0) = 0 + 1 - 2 = -1$

$y - 0 = -1(x - 0)$

$\boxed{y = -x}$

2.1

32. $f(x) = \frac{1}{x+1} \quad ; \ (0,1) = (x_1, y_1)$

$f'(x) = \frac{(x+1)(0) - (1)(1)}{(x+1)^2} = \frac{-1}{(x+1)^2}$

$m = f'(0) = \frac{-1}{(0+1)^2} = -1$

$y - 1 = -1(x - 0) \Rightarrow \boxed{y = -x + 1}$

Find f'(x)

2.2

43. $f(x) = \dfrac{x^3 - 3x^2 + 4}{x^2} = \dfrac{x^3}{x^2} - \dfrac{3x^2}{x^2} + \dfrac{4}{x^2} = x - 3 + 4x^{-2}$

$f'(x) = \boxed{1 - 8x^{-3}} = \dfrac{x^3}{x^3} \cdot 1 - \dfrac{8}{x^3} = \boxed{\dfrac{x^3 - 8}{x^3}}$

$f(x) = \tan x = \dfrac{\sin x}{\cos x}$

$f'(x) = \dfrac{(\cos x)(\cos x) - (\sin x)(-\sin x)}{(\cos x)^2}$

$= \dfrac{\cos^2 x + \sin^2 x}{\cos^2 x} = \dfrac{1}{\cos^2 x} = \boxed{\sec^2 x}$

(Low)(dee high) less (high)(dee low)

—— draw the line ——

& square below

$$\left(\frac{f}{g}\right)' = \frac{g f' - f g'}{g^2}$$

2.1 #29, 31, 89

2.2 #19, 27, 29, 35, 37, 43, 45, 51
57, 61, 63, 67, 95, 97, 115

2.3 #35, 41-53 odd, 73, 83