

Taylor series $\sin(x)$ $\cos(x)$ $\sinh(x)$ $\cosh(x)$

$$\begin{cases} e^x = 1 + x + \frac{1}{2}x^2 + \frac{1}{6}x^3 + \frac{1}{24}x^4 + \frac{1}{120}x^5 + \dots \\ (e^x)' = 0 + 1 + x + \frac{1}{2}x^2 + \frac{1}{6}x^3 + \frac{1}{24}x^4 + \frac{1}{120}x^5 + \dots \end{cases}$$

$$e^x = (e^x)'$$

$$\rightarrow \frac{(3-5xe^x)}{3x+2} = f(x)$$

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

$$f'(x) = \frac{\underbrace{(3-5xe^x)'}_{\downarrow} (3x+2) - (3-5xe^x) \underbrace{(3x+2)'}_3}{(3x+2)^2}$$

$$\underline{(3-5xe^x)'} = \cancel{0} - (5e^x + 5xe^x)$$

$$f'(x) = \frac{(-5e^x - 5xe^x)(3x+2) - 3(3-5xe^x)}{(3x+2)^2}$$

x^2
110+

$$f(x) = \frac{x^{1/3} - 4}{x^{7/2}}$$

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

$$f'(x) = \frac{(x^{1/3} - 4)' (x^{7/2}) - (x^{7/2})' (x^{1/3} - 4)}{(x^{7/2})^2}$$

$$f'(x) = \frac{\left(\frac{1}{3}x^{-2/3}\right)(x^{7/2}) - \left(\frac{7}{2}x^{5/2}\right)(x^{1/3} - 4)}{x^7} \checkmark$$

$$f(x) = (e^x)^2 + 2e^x + xe^2 + x^e$$

$$f(x) = e^{2x} + \boxed{2e^x} + \underbrace{xe^2}_{(0.71\dots)^2} + \underbrace{x^e}_{(0.71\dots)^2}$$

$$f'(x) = 2(e^x)^2 + 2e^x + e^2 + ex^{e-1} \checkmark$$

$$\underline{2 \cdot e^x} = \underbrace{(2)'e^x}_0 + \underline{2}(e^x)'$$

$$(e^{2x})' = 2e^{2x}$$

$$\rightarrow e^{2x} \cdot 2 = 2e^{2x}$$

$$e^{2x} = \underbrace{(e^x)^2}_{\substack{\text{product} \\ \text{rule}}} = e^x \cdot e^x$$

$$(e^x)' e^x + e^x (e^x)'$$

$$(e^x)^2 + (e^x)^2 \rightarrow 2(e^x)^2 = 2e^{2x}$$

$$f(x) = \frac{-\sin x}{\cos x} = -\tan(x) \quad (\tan x)' = \sec^2 x$$

$$\frac{(-\sin x)' \cos x - (-\sin x)(\cos x)'}{\cos^2 x}$$

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

$$(-\sin x)' = -(\cos x)'$$

$$= \frac{(-\cos x)(\cos x) - (+\sin x)(+\sin x)}{\cos^2 x}$$

$$= \frac{-\cos^2 x - \sin^2 x}{\cos^2 x} = -\frac{(\cos^2 x + \sin^2 x)}{\cos^2 x} = \frac{-1}{\cos^2 x} = -\sec^2 x$$

$$f(x) = \frac{1}{3}x^3 - 2x^2 + 4x + 7$$

$$f'(x) = x^2 - 4x + 4$$

$$0 = (x-2)(x-2)$$

$$x = 2$$

$$m = 0$$

$$f(2) = \frac{1}{3} \cdot 8 - 2 \cdot 4 + 4 \cdot 2 + 7$$

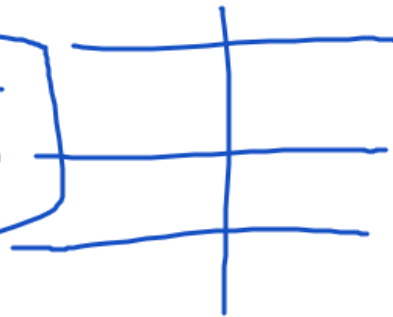
$$\frac{8}{3} + 7 = \frac{8}{3} + \frac{21}{3} = \frac{29}{3}$$

What does it mean
for a function to have
a horizontal tangent
line

$$\rightarrow f'(x) = 0$$

$$y = \frac{29}{3} = 0(x-2)$$

$$\rightarrow y = \frac{29}{3}$$



$$f'(x) = x^2 - 4x + 4$$

$$f''(x) = 2x - 4$$

#7 HW 8

$$f(x) = (3 - 5xe^x)(3x + 2)$$

$$(0 - \underline{\underline{5e^x + 5xe^x}})(3x + 2) + (3 - 5xe^x)(3)$$