Taylor series

$$e^x = 1 + x + \frac{1}{2}x^2 + \frac{1}{6}x^3 + \frac{1}{24}x^4 + \frac{1}{5!}x^5 + \dots$$

$$(e^x)' = \cancel{0} + 1 + x + \frac{1}{2}x^2 + \frac{1}{6}x^3 + \frac{1}{24}x^4 + \dots$$

$$\sin(x) = x + \frac{1}{6}x^3 - \frac{1}{5!}x^5 + \dots$$

$$\cos(x) = 1 + \frac{1}{2}x^2 - \frac{1}{24}x^4 + \dots$$

#6 HW 8

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

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

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

$$\overbrace{2x^2 - 2xe^x + 6xe^x} + 6e^{2x} - (x^2 - 2e^x + 3x^2e^x - 6e^{2x})$$

$$2x^2 + 4xe^x - \cancel{6e^{2x}} - \cancel{x^2} + 2e^x - 3x^2e^x + \cancel{6e^{2x}}$$

$$f'(x) = \frac{x^2 + 4xe^x + 2e^x - 3x^2e^x}{(x+3e^x)^2}$$

#7 HW 8

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

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

$$= \left(0 - \left(5e^x + 5xe^x\right)\right)(3x+2) + (3 - 5xe^x)(3+0)$$

$$(\underline{5x}\,\underline{e^x})' = (5x)'e^x + (5x)(e^x)'$$

$$= \underline{5e^x + 5xe^x}$$

$$(5x)'$$

$$\underbrace{(5)'x}_{0} + \underbrace{5(x')}_{5(1)} = 5$$

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

$$x^2 = x \cdot x = (x')x + x(x')$$

$$1x + x \cdot 1 = 2x$$

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

$f(x)$

$f'(x) = 0$

$\boxed{f(x) = x^2 + 3x - 6}$

$\boxed{f'(x)} = 2x + 3 = 0$

$2x = -3$

$x = -1.5$