What is the product Rule for finding a derivative?

Let $y = f(x) \cdot g(x)$

$y' = f(x) \cdot g'(x) + g(x) f'(x)$

$y' = (\text{first}) \frac{d}{dx}(\text{second}) + (\text{second}) \frac{d}{dx}(\text{first})$

Find: $f'(x)$

Given: $f(x) = x^2 e^x$

$f(x) = \boxed{x^2} \cdot \boxed{e^x}$

$f'(x) = x^2 \frac{d}{dx}[e^x] + e^x \frac{d}{dx}[x^2]$

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

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

What is the Quotient Rule for finding a derivative?

Let $y = \frac{f(x)}{g(x)}$

$y' = \frac{g(x)f'(x) - f(x)g'(x)}{[g(x)]^2}$

$y' = \frac{lo\,d\,hi - hi\,d\,lo}{lo^2}$

Find $f'(x)$

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

$f(x) = \frac{2x+3}{x^2-x}$ hi / lo

$f'(x) = \frac{(x^2-x)\frac{d}{dx}[2x+3] - (2x+3)\frac{d}{dx}[x^2-x]}{[x^2-x]^2}$

$f'(x) = \frac{(x^2-x)(2) - (2x+3)(2x-1)}{(x^2-x)^2}$ • distribute negative!

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