

MTH141 STEWART SECTION 3.2

1. SECTION 3.1

1) Differentiate the function:

$$F(x) = x \sin x$$

Think of F as the product of two functions: $f(x) = x$ and $g(x) = \sin(x)$.

Applying the product rule,

$$(f \cdot g)'(x) = f(x)g'(x) + g(x)f'(x) = x \cos x + 1 \cdot \sin x = \sin x + x \cos x$$

2) Differentiate the function

$$F(x) = \frac{e^x}{x}$$

Think of this as

$$F(x) = \frac{f(x)}{g(x)}$$

with $f(x) = e^x$ and $g(x) = x$. Apply the quotient rule,

$$(f/g)' = \frac{gf' - fg'}{g^2} = \frac{xe^x - e^x}{x^2} = \frac{e^x(x-1)}{x^2}$$

3) Differentiate the function

$$F(x) = \frac{x+2}{x-1}$$

Think of this as

$$F(x) = \frac{f(x)}{g(x)}$$

with $f(x) = x+2$ and $g(x) = x-1$. Apply the quotient rule,

$$(f/g)' = \frac{gf' - fg'}{g^2} = \frac{(x-1) \cdot 1 - (x+2) \cdot 1}{(x-1)^2} = \frac{-3}{(x-1)^2}$$