

Section 3.2 Notes

**The Product Rule:** If  $f$  and  $g$  are both differentiable, then

$$\frac{d}{dx}[f(x)g(x)] = f(x)\frac{d}{dx}g(x) + g(x)\frac{d}{dx}f(x)$$

**Example 1:** If  $f(x) = xe^x$  find  $f'(x)$ .

$$\begin{array}{l} f = x \\ f' = 1 \end{array} \quad \begin{array}{l} g = e^x \\ g' = e^x \end{array}$$

$$e^x + xe^x$$

$$\boxed{e^x(1+x)}$$

**The Quotient Rule:** If  $f$  and  $g$  are both differentiable, then

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

**Example 2:** If  $y = \frac{x^2+x-2}{x^3+6}$ , find  $y'$ .

$$\begin{array}{l} f = x^2 + x - 2 \\ f' = 2x + 1 \end{array} \quad \begin{array}{l} g = x^3 + 6 \\ g' = 3x^2 \end{array}$$

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

$$y' = \frac{2x^4 + 12x + x^3 + 6 - 3x^4 - 3x^3 + 6x^2}{(x^3+6)^2}$$

$$\boxed{y' = \frac{-x^4 - 2x^3 + 6x^2 + 12x + 6}{(x^3+6)^2}}$$

Homework day 1: page 188 (1-9)

Day 2: page 188 (10-12, 25, 35, 41, 42, 45, 51-53)