MT 1800 Calculus I
Worksheet 3.3 – The Product and quotient rules

Purpose: Introduction to product and quotient rules.

The **product rule** is used to find the derivatives of products of differentiable functions.

It may be stated as follows:

For $f(x) = g(x) * h(x)$

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

The **quotient rule** is a method of finding the derivative of a function that is the quotient of two other functions for which derivatives exist.

If the function one wishes to differentiate, $f(x)$, can be written as

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

and $h(x) \neq 0$, then the rule states that the derivative of $g(x) / h(x)$ is equal to:

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

Examples:

1. $f(x) = (3x^2 + 5)e^x$

$g(x)$		$g'(x)$	
$h(x)$		$h'(x)$	

$f'(x) =$

2. $f(x) = \frac{3x^2+5}{x+5}$

$g(x)$		$g'(x)$	
$h(x)$		$h'(x)$	

$f'(x) =$

3. $f(x) = \frac{xe^x}{x+2}$

$g(x)$		$g'(x)$	
$h(x)$		$h'(x)$	

$f'(x) =$