

# MATH 250/GRACEY

## WORKSHEET/2.3

Use the following "short-cut" rules to evaluate the derivative of the following functions. Identify  $f(x)$  and  $g(x)$ . Fully simplify your result, writing as a single rational expression with positive exponents, when applicable.

$$\text{Product rule: } \frac{d}{dx} [f(x)g(x)] = f'(x)g(x) + f(x)g'(x)$$

Extension of the product rule:

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

$$\text{Quotient rule: } \frac{d}{dx} \left[ \frac{f(x)}{g(x)} \right] = \frac{f'(x)g(x) - f(x)g'(x)}{[g(x)]^2}$$

$$\text{Remaining trigonometric functions: } \frac{d}{dx} [\tan x] = \sec^2 x \quad \frac{d}{dx} [\cot x] = -\csc^2 x$$

$$\frac{d}{dx} [\sec x] = \sec x \tan x \quad \frac{d}{dx} [\csc x] = -\csc x \cot x$$

1.  $y = x \cos x + \tan x$

2.  $h(x) = \frac{\sqrt{x}}{x^2 - 1}$

3.  $h(t) = \frac{\sqrt[4]{t}}{2\sqrt[4]{t} - 1}$

4.  $y = (x^2 - 1)\sec x \csc x$

5.  $y = (2x^3 - 5)^2$

6. Find the equation of the tangent line at  $t = 4$  for the function  $s(t) = \frac{t}{1-t}$ .