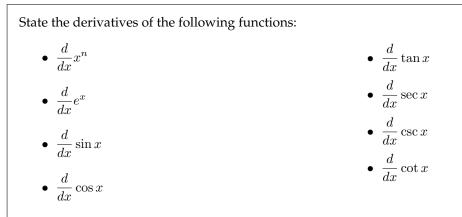
RECITATION: 3-1 TO 3-3 REVIEW OF BASIC DIFFERENTIATION

Disclaimer: On this worksheet "Simplify" is short for "simplify your answer by combining like terms, factoring out any common factors and finding a common denominator, if necessary."



Suppse f and g are differentiable functions. State the derivatives of the following functions. What rules are these?

•
$$\frac{d}{dx}(f(x)g(x))$$

Example 1: Find the derivative of the following functions.

a)
$$y = \frac{1}{2}x^6 - 3x^4 + x$$

b) $f(t) = 2 - \frac{2}{3}t + \tan x$

Example 2: Find the derivative of the following functions.

a)
$$y = \pi^2 + \ln 2 + e^5$$

b) $f(x) = \sqrt[5]{x} + 4\sqrt{x^5} + \cot x$

Example 3: Find the derivative of the following functions.

a)
$$y = 5e^x + 3\cos x + \sec x$$

b) $y = 5 + 2\sin x + \sqrt{x}$

Example 4: Find the derivative of the following functions. Simplify.

a)
$$h(x) = (x^2 + 3)(x - 5)$$

b) $y = \frac{x^3 - 2x + 6}{x^2}$

Example 5: For what values of x does the graph of $f(x) = 2x^3 + 3x^2 - 12x + 1$ has a horizontal tangent?

Example 6: Find the derivative of the following functions. Simplify.

a)
$$y = \frac{x+1}{x^3+x-2}$$
 b) $f(x) = x^3 \cos x$

Example 7: Suppose f(2) = -3, g(2) = 4, f'(2) = -2, and g'(2) = 7. Find h'(2) if $h(x) = \frac{g(x)}{2 + f(x)}$.

Example 8: For what values of x does $f(x) = x + 2 \sin x$ have a horizontal tangent? (Hint: There are an infinite number of them. Don't give just one.)

Example 9: Differentiate $f(\theta) = \theta \cos \theta \sin \theta$

Example 10: Find an equation of the tangent line to $y = x + \tan x$ at (π, π) . Give your answer in slope-intercept form.