Table of derivatives

1.$(C)' = 0$, C is a constant,

2.$(x)' = 1$,

3.$(x^2)' = 2x$,

4.$(x^n)' = nx^{n-1}$,

5. $\left(\frac{1}{x}\right)' = -\frac{1}{x^2}$

Differentiation formulas

Suppose c is a constant and both functions $f(x)$ and $g(x)$ are differentiable.

1. $(cf(x))' = cf'(x)$,

2. $(f(x) + g(x))' = f'(x) + g'(x)$,

3. $(f(x) - g(x))' = f'(x) - g'(x)$,

4. $(f(x)g(x))' = f'(x)g(x) + f(x)g'(x)$,

5. $\left(\dfrac{f(x)}{g(x)}\right)' = \dfrac{f'(x)g(x) - f(x)g'(x)}{g^2(x)}$.

Example 1. Differentiate each function.
(a.) $f(x) = x^5 - 4x^3 + 2x - 3$

(b.) $f(x) = 3x^{2/3} - 2x^{5/2} + x^{-3}$

(c.) $f(x) = x^2 \sqrt[3]{x^2}$

(d.) $f(x) = \dfrac{2}{\sqrt[3]{x^2}} - \dfrac{1}{x\sqrt[3]{x}}$

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

(f.) $g(x) = \dfrac{2x + 3}{x^2 - 5x + 5}$

(g.) $f(z) = \dfrac{1 + \sqrt{z}}{1 - \sqrt{z}}$

Example 2. Find the equation to the tangent line to the curve $y = x + \sqrt{x}$ at the point (1,2)

Example 3. The object is moving upward. Its height after t sec is given by $h(t) = 58t - 0.83t^2$
(a.) What is the maximum height reached by the object?

(b.) Find the instantaneous velocity at $t = 1$