Basic Differentiation Rules

Theorem 1: If *f(x) = c*, then *f'(x) = 0*

Example 1: Find *f'(x)*.

$a)\ f(x) = 2$ $b)\ f(x) = \pi$

Theorem 2: If $f(x) = x^n$ then $f'(x) = nx^{n-1}$

Example 2: Find *f'(x)*.

$a)\ f(x) = x^5$ $b)\ f(x) = \sqrt{x}$

Example 3:

Find the slope of the curve $y = \sqrt[4]{x^3}$ at $x = 16$.

Theorem 3: If $f(x) = cx^n$ then $f'(x) = n \cdot cx^{n-1}$

Example 4: Find *f'(x)*.

$a)\ 6x^3$ $b)\ 9\sqrt[3]{x}$

a) $6x^3$

b) $9\sqrt[3]{x}$

Theorem 4: If $f(x) = g(x) \pm h(x)$ then $f'(x) = g'(x) \pm h'(x)$

Example 5: Find *f'(x)*.

a) $f(x) = 3x^2 + 2x + 1$

b) $f(x) = 4x^5 - 3x^4 + 2x^3 - 7x^2 + 6x - 1$

c) $f(x) = \sqrt{x}\left(x + 5\right)$

d) $f(x) = \frac{6}{\sqrt[3]{x}} + \frac{4}{x^2} - 7$

e) $f(x) = \frac{6x^4 + 8x^3}{2x^2}$

f) $f(x) = \frac{7x^7}{4}$

Theorem 5: If $f(x) = c \bullet g(x)$ then $f'(x) = c \bullet g'(x)$

Example 6: Find *f'(x)*.

$f(x) = 3\left(x^2 + 7\right)$