

Directions: Find the derivative of each of the following functions.

1. $f(x) = 4x^6 + \pi^2 + 1$

$$f'(x) = 24x^5$$

Note: π^2 is a constant

2. $f(x) = 3\sqrt[5]{x^3} = 3x^{\frac{3}{5}}$

$$f'(x) = 3 \cdot \frac{3}{5} x^{\frac{3}{5}-1} = \frac{9}{5} x^{-\frac{2}{5}} = \frac{9}{5x^{2/5}} = \boxed{\frac{9}{5\sqrt[5]{x^2}}}$$

3. $f(x) = \frac{2}{x} + \frac{1}{2} = 2x^{-1} + \frac{1}{2}$

$$f'(x) = 2(-1x^{-1-1}) + 0 = -2x^{-2} = \boxed{\frac{-2}{x^2}}$$

4. $f(x) = \frac{1}{\sqrt{x}} = \frac{1}{x^{1/2}} = x^{-1/2}$

$$f'(x) = -\frac{1}{2}x^{-\frac{1}{2}-1} = -\frac{1}{2}x^{-3/2} = \frac{-1}{2x^{3/2}} = \boxed{\frac{-1}{2\sqrt{x^3}}}$$

Directions: Find the derivative of each of the following functions.

1. $f(x) = 2x^7 + x - 4$

$$f'(x) = 14x^6 + 1$$

2. $f(x) = 5\sqrt[4]{x^3} = 5x^{\frac{3}{4}}$

$$f'(x) = 5 \cdot \frac{3}{4} x^{\frac{3}{4}-1} = \frac{15}{4} x^{-\frac{1}{4}} = \frac{15}{4} \frac{1}{x^{\frac{1}{4}}} = \frac{15}{4\sqrt[4]{x}}$$

3. $f(x) = \frac{2}{x^2} + \frac{x^2}{2} = 2x^{-2} + \frac{1}{2}x^2$

$$f'(x) = 2(-2x^{-3}) + \frac{1}{2} \cdot 2x^1 = x - \frac{4}{x^3}$$

4. $f(x) = \frac{1}{\sqrt[3]{x}} = \frac{1}{x^{\frac{1}{3}}} = x^{-\frac{1}{3}}$

$$f'(x) = -\frac{1}{3} x^{-\frac{1}{3}-1} = -\frac{1}{3} x^{-\frac{4}{3}} = -\frac{1}{3} \frac{1}{x^{\frac{4}{3}}}$$

$$= \frac{-1}{3\sqrt[3]{x^4}}$$

Directions: Find the derivative of each of the following functions.

1. $f(x) = 6x^2 - 3x + 1$

$$f'(x) = 12x - 3$$

2. $f(x) = 9\sqrt[5]{x^4} = 9x^{\frac{4}{5}}$

$$f'(x) = 9 \cdot \frac{4}{5} x^{\frac{4}{5}-1} = \frac{36}{5} x^{-\frac{1}{5}} = \frac{36}{5x^{\frac{1}{5}}} = \frac{36}{5\sqrt[5]{x}}$$

3. $f(x) = \frac{5}{2x^2} + \frac{x^6}{3} = \frac{5}{2}x^{-2} + \frac{1}{3}x^6$

$$f'(x) = \frac{5}{2}(-2x^{-2-1}) + \frac{1}{3}6x^5 = -5x^{-3} + 2x^5$$
$$= 2x^5 - \frac{5}{x^3}$$

4. $f(x) = \frac{1}{\sqrt[4]{x}} = \frac{1}{x^{1/4}} = x^{-1/4}$

$$f'(x) = -\frac{1}{4}x^{-\frac{1}{4}-1} = -\frac{1}{4}x^{-\frac{5}{4}} = \frac{-1}{4x^{5/4}} = \frac{-1}{4\sqrt[4]{x^5}}$$

Directions: Find the derivative of each of the following functions.

1. $f(x) = 2x^7 - x + 2$

$$f'(x) = 14x^6 - 1$$

2. $f(x) = 3\sqrt{x^7} = 3x^{\frac{7}{2}}$

$$f'(x) = 3 \cdot \frac{7}{2} x^{\frac{7}{2}-1} = \frac{21}{2} x^{\frac{5}{2}} = \frac{21\sqrt{x}^5}{2}$$

3. $f(x) = \frac{x^5}{5} - \frac{4}{2x^2} = \frac{1}{5}x^5 - 2x^{-2}$

$$f'(x) = \frac{1}{5} \cdot 5x^4 - 2(-2x^{-3}) = x^4 + 4x^{-3} = x^4 + \frac{4}{x^3}$$

4. $f(x) = \frac{1}{\sqrt[5]{x}} = \frac{1}{x^{1/5}} = x^{-1/5}$

$$f'(x) = -\frac{1}{5} x^{-1/5-1} = -\frac{1}{5} x^{-6/5} = \frac{-1}{5x^{6/5}} = \frac{-1}{5\sqrt[5]{x^6}}$$