

Power Rule

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Derivative Rules:

- $\frac{d}{dx}c = 0$
- $\frac{d}{dx}(f(x) \pm g(x)) = \frac{df(x)}{dx} \pm \frac{dg(x)}{dx}$
- $\frac{d}{dx}x^n = nx^{n-1}$ for all $n \in \mathbb{R}$
- $\frac{d}{dx}cf(x) = c\frac{d}{dx}f(x)$

1. Find the derivative of $f(x) = 2x^3 + x - 7$

$$\begin{aligned}f'(x) &= 2 \cdot 3x^{3-1} + 1x^{1-1} - 0 \\&= \underline{6x^2 + 1}\end{aligned}$$

2. Find the derivative of $f(x) = -x^5 + x^2 - 3x + 2$

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

3. Find the derivative of $f(x) = 3x^4 + 4x^2 + 2x + 1$

$$\underline{f'(x) = 12x^3 + 8x + 2}$$

4. Find the derivative of $f(x) = 7x^6 - x^5 + 2x^3 + x^2 - x + 5$

$$f'(x) = 42x^5 - 5x^4 + 6x^2 + 2x - 1$$

5. Find the derivative of $f(x) = x^{3/2} - x^2 + 2x^{-2}$

$$\begin{aligned} f'(x) &= \frac{3}{2}x^{\frac{3}{2}-1} - 2x - 4x^{-2-1} \\ &= \frac{3}{2}x^{\frac{1}{2}} - 2x - 4x^{-3} \end{aligned}$$

6. Find the derivative of $f(x) = \sqrt{x} - \frac{2}{x^3} = x^{\frac{1}{2}} - 2x^{-3}$

$$\begin{aligned} f'(x) &= \frac{1}{2}x^{\frac{1}{2}-1} + 6x^{-3-1} \\ &= \frac{1}{2}x^{-\frac{1}{2}} + 6x^{-4} \end{aligned}$$

7. Find the derivative of $f(x) = x^\pi$

$$f'(x) = \pi x^{\pi-1}$$
