

Basic Derivatives

$$1. f(x) = 3x^5 \rightarrow f'(x) = 15x^4$$

$$2. f(x) = 3x^4 - 12x^2 + 3 \rightarrow f'(x) = 12x^3 - 24x$$

$$3. g(x) = x^{\frac{2}{3}} - x^{-\frac{1}{3}} \rightarrow g'(x) = \frac{2}{3}x^{-\frac{1}{3}} + \frac{1}{3}x^{-\frac{4}{3}}$$

$$4. h(x) = 2x^{\frac{5}{4}} + 3x^{-2} - x \rightarrow h'(x) = \frac{5}{2}x^{\frac{1}{4}} - 6x^{-3} - 1$$

$$5. f(x) = \sqrt{x} - \sqrt[3]{x} = x^{\frac{1}{2}} - x^{\frac{1}{3}} \rightarrow f'(x) = \frac{1}{2}x^{-\frac{1}{2}} - \frac{1}{3}x^{-\frac{2}{3}}$$

$$6. h(x) = 3x - 3 + 3x^{-3} \rightarrow h'(x) = 3 - 9x^{-4}$$

$$7. f(x) = x^{\pi} \rightarrow f'(x) = \pi x^{\pi-1}$$

$$8. f(x) = e^2 \rightarrow f'(x) = 0$$

$\rightarrow$ constant

$$9. g(x) = x^{10} + x^2 - 3x^{-\frac{2}{3}} + 4x^{-5} \rightarrow g'(x) = 10x^9 + 2x + 2x^{\frac{5}{3}} - 20x^{-6}$$

$$10. h(x) = 5x^{-6} - 3x^4 - x + \sqrt{x} - 5x^{-\frac{4}{5}}$$

$$\hookrightarrow h'(x) = -30x^{-7} - 12x^3 - 1 + \frac{1}{2\sqrt{x}} + 4x^{-\frac{9}{5}}$$