

# Basic Derivative Rules

## 2.1A – Power Rule

A: The Power Rule

#1) Find  $\frac{d}{dx} x^5$

#2) Find  $\frac{dx^{700}}{dx}$

#3) If  $y = x^{-2/3}$ , find  $y'$

#4) If  $y = 7\sqrt{x}$ , find  $y'$

#5) Find  $\frac{d}{dx} \left(\frac{x^2}{5}\right)$

#6) Find  $\frac{d}{dx} \left(\frac{6}{x^6}\right)$

#7) If  $y = \sqrt[6]{x}$ , find  $y'$

#8) If  $y = 9x$ , find  $y'$

#9) Find  $\frac{d}{dx} (5x^3 - 5x^2 + 7x + 9)$

#10) If  $y = 5x^{-7} + 9x^{-3} - 9$ , find  $y'$

#11) If  $f(x) = \pi x^4 - x^\pi$ , find  $f'(x)$

#12) Find  $\frac{d}{dx} \left(\frac{8}{\sqrt[4]{x}} - \frac{5}{\sqrt{x}}\right)$

#13) Find  $\frac{d}{dx} \left(\frac{x^3 + x^5}{x}\right)$

#14) Find  $f'(x)$  if  $f(x) = \sqrt[6]{x} + \frac{3}{\sqrt[7]{x^5}}$

#15) Find  $\frac{d}{dx} 90,000,000,000$

#16) If  $f(x) = 0$ , find  $f'(x)$

B: Find each equation in slope-intercept form.

#17) Find the equation of the tangent line to  $f(x) = x^2 - 4x + 8$  at  $x = 4$

#18) Find the equation of the tangent line to  $f(x) = 3x^2 + 8$  at  $x = -2$

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Ex C: Evaluate each derivative

#19) If  $f(x) = x^3$ , find  $f'(-2)$ .

#20) If  $f(r) = \frac{4}{3}\pi r^3$ , find  $f'(2)$ .

#21) If  $f(x) = \sqrt[3]{x} + \frac{1}{\sqrt{x}}$ , find  $f'(1)$ .

#22) If  $f(x) = 6\sqrt{x}$ , find  $f'(8)$ .

#23) If  $f(x) = \frac{4}{x^2}$ , find  $f'(3)$ .

#24) If  $f(x) = x^3$ , find  $\left.\frac{df}{dx}\right|_{x=-3}$

#25) If  $f(r) = \frac{4}{3}\pi r^3$ , find  $\left.\frac{df}{dr}\right|_{r=4}$

#26) If  $f(x) = \sqrt[3]{x} + \frac{1}{\sqrt{x}}$  find  $\left.\frac{df}{dx}\right|_{x=2}$

#27) If  $f(x) = 6\sqrt{x^5}$ , find  $\left.\frac{df}{dx}\right|_{x=16}$

#28) If  $f(x) = \frac{1}{x^{-5}}$ , find  $\left.\frac{df}{dx}\right|_{x=2}$

D: Find each equation in slope-intercept form

#29) Find the equation of the tangent line to  $f(x) = 4x^2 - 10x + 81$  at  $x = 1$

#30) Find the equation of the tangent line to  $f(x) = -2x^2 + 3x + 1$  at  $x = -5$