

Use the power rule to calculate the derivatives of the following power functions. You may need to rewrite the problems as painfully obvious power functions first.

Power Rule for derivatives:

$$\text{If } f(x) = a \cdot x^n, f'(x) = \frac{df}{dx} = a \cdot n \cdot x^{n-1} \text{ OR } \frac{d}{dx} a x^n = a \cdot n x^{n-1}$$

$$\frac{d}{dx} 5x^4 = 20x^3$$

$$\frac{d^2}{dx^2} 5x^4 = \frac{d}{dx} 20x^3 = 60x^2$$

$$\frac{d}{dx} 7x^3 = 21x^2$$

$$\frac{d^2}{dx^2} 7x^3 = 42x$$

$$\frac{d}{dx} 8x^7 = 56x^6$$

$$\frac{d^2}{dx^2} 8x^7 = 336x^5$$

$$\frac{d}{dx} -3x^4 = -12x^3$$

$$\frac{d^2}{dx^2} -3x^4 = -36x^2$$

$$\frac{d}{dx} 6x^{1/2} = 3x^{-1/2}$$

$$\frac{d^2}{dx^2} 6x^{1/2} = -\frac{3}{2}x^{-3/2}$$

$$\frac{d}{dx} 7x^{3/4} = \frac{21}{4}x^{-1/4}$$

$$\frac{d^2}{dx^2} 7x^{3/4} = -\frac{21}{16}x^{-5/4}$$

$$\frac{d}{dx} \frac{1}{2}x^{-3/4} = -\frac{3}{8}x^{-7/4}$$

$$\frac{d^2}{dx^2} \frac{1}{2}x^{-3/4} = \frac{21}{32}x^{-11/4}$$

$$\frac{d}{dx} 4x^{7/4} = 7x^{3/4}$$

$$\frac{d^2}{dx^2} 4x^{7/4} = \frac{21}{4}x^{-1/4}$$

$$\frac{d}{dx} x^{1.4} = 1.4x^{0.4}$$

$$\frac{d^2}{dx^2} x^{1.4} = 0.56x^{-0.6}$$

$$\frac{d}{dx} 2x^{0.3} = 0.6x^{-0.7}$$

$$\frac{d^2}{dx^2} 2x^{0.3} = -0.42x^{-1.7}$$

$$\frac{d}{dx} 1.7x^2 = 3.4x$$

$$\frac{d^2}{dx^2} 1.7x^2 = 3.4$$

$$\frac{d}{dx} \sqrt{x^3} = \frac{d}{dx} x^{3/2} = \frac{3}{2} x^{1/2}$$

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

$$\frac{d}{dx} \sqrt[5]{x^2} = \frac{d}{dx} x^{2/5} = \frac{2}{5} x^{-3/5}$$

$$\frac{d}{dx} \sqrt{x} = \frac{d}{dx} x^{1/2} = \frac{1}{2} x^{-1/2}$$

$$\frac{d}{dx} \sqrt[3]{x} = \frac{d}{dx} x^{1/3} = \frac{1}{3} x^{-2/3}$$

$$\frac{d}{dx} \sqrt{x^5} = \frac{d}{dx} x^{5/2} = \frac{5}{2} x^{3/2}$$

$$\frac{d}{dx} \sqrt[3]{x^2} = \frac{d}{dx} x^{2/3} = \frac{2}{3} x^{-1/3}$$

$$\frac{d}{dx} \sqrt[7]{x^2} = \frac{d}{dx} x^{2/7} = \frac{2}{7} x^{-5/7}$$

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

$$\frac{d}{dx} \sqrt[4]{x^5} = \frac{d}{dx} x^{5/4} = \frac{5}{4} x^{1/4}$$

$$\frac{d}{dx} \sqrt[6]{x^5} = \frac{d}{dx} x^{5/6} = \frac{5}{6} x^{-1/6}$$

$$\frac{d}{dx} 7 \sqrt[4]{x^9} = \frac{d}{dx} 7 x^{9/4} = \frac{63}{4} x^{5/4}$$

$$\frac{d}{dx} \frac{1}{\sqrt{x^3}} = \frac{d}{dx} x^{-3/2} = -\frac{3}{2} x^{-5/2}$$

$$\frac{d}{dx} \frac{1}{\sqrt[4]{x}} = \frac{d}{dx} x^{-1/4} = -\frac{1}{4} x^{-5/4}$$

$$\frac{d}{dx} \frac{1}{\sqrt[5]{x^2}} = \frac{d}{dx} x^{-2/5} = -\frac{2}{5} x^{-7/5}$$

$$\frac{d}{dx} \frac{1}{\sqrt{x}} = \frac{d}{dx} x^{-1/2} = -\frac{1}{2} x^{-3/2}$$

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

$$\frac{d}{dx} \frac{1}{\sqrt{x^5}} = \frac{d}{dx} x^{-5/2} = -\frac{5}{2} x^{-7/2}$$

$$\frac{d}{dx} \frac{1}{\sqrt[3]{x^2}} = \frac{d}{dx} x^{-2/3} = -\frac{2}{3} x^{-5/3}$$

$$\frac{d}{dx} \frac{1}{\sqrt[5]{x^3}} = \frac{d}{dx} x^{-3/5} = -\frac{3}{5} x^{-8/5}$$

$$\frac{d}{dx} \frac{1}{\sqrt[4]{x^3}} = \frac{d}{dx} x^{-3/4} = -\frac{3}{4} x^{-7/4}$$

$$\frac{d}{dx} \frac{1}{\sqrt[4]{x^5}} = \frac{d}{dx} x^{-5/4} = -\frac{5}{4} x^{-9/4}$$