

POTÊNCIAS FRACIONÁRIAS

$$\sqrt{x} = x^{\frac{1}{2}} ??$$

$$2 = \sqrt{2} \cdot \sqrt{2}$$

$$2 = 2^{\frac{1}{2}} \cdot 2^{\frac{1}{2}} = 2^{\frac{1}{2} + \frac{1}{2}} = 2^1 = 2$$

$$3 = \sqrt[3]{3} \cdot \sqrt[3]{3} \cdot \sqrt[3]{3} = 3^{\frac{1}{3}} \cdot 3^{\frac{1}{3}} \cdot 3^{\frac{1}{3}} = 3^{\frac{1}{3} + \frac{1}{3} + \frac{1}{3}} = 3^1 = 3$$

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

$$\sqrt[3]{x^2} = x^{\frac{2}{3}}$$

$$\sqrt[5]{x^3} = x^{\frac{3}{5}}$$

$$\sqrt[5]{x^2} = x^{\frac{2}{5}}$$

$$f(x) = \sqrt[3]{x} \longrightarrow f'(x) = ??$$

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

$$x^n \longrightarrow n x^{n-1}$$

$$= \frac{1}{3} x^{-\frac{2}{3}} = \frac{1}{3} \cdot \frac{1}{x^{\frac{2}{3}}}$$

$$= \frac{1}{3} \cdot \frac{1}{\sqrt[3]{x^2}} = \frac{1}{3\sqrt[3]{x^2}}$$

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

$$g(x) = \frac{1}{\sqrt[3]{x}} = \frac{1}{x^{\frac{1}{3}}} = 1 \cdot x^{-\frac{1}{3}} = x^{-\frac{1}{3}}$$

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

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

$$= \frac{3}{5} \cdot x^{-\frac{2}{5}}$$

$$= \frac{3}{5} \cdot \frac{1}{x^{\frac{2}{5}}}$$

$$= \frac{3}{5} \cdot \frac{1}{\sqrt[5]{x^2}} = \frac{3}{5\sqrt[5]{x^2}}$$

EXERCÍCIOS

26.1. Calcule as seguintes derivadas:

$$\text{a) } f(x) = \sqrt[3]{x^2}$$

$$\text{b) } f(x) = 3\sqrt[5]{x} - x^5$$

$$\text{c) } f(x) = \frac{1}{\sqrt{x}} + \frac{1}{x^2}$$

$$\text{d) } f(x) = \frac{\sqrt[3]{x}}{3} - \frac{2}{\sqrt[3]{x^2}} + 3$$

$$\text{e) } f(x) = x^2 - \frac{1}{x^2} - \frac{\sqrt[3]{x}}{2} - \frac{2}{\sqrt[3]{x}} + 3$$