

Ableitungen mit der Potenzregel

Überblick Anwendungen der Potenzregel

Potenzregel $f(x) = x^n$ $f'(x) = n \cdot x^{n-1}$ mit $x \in \mathbb{N}$

$$f(x) = x^2$$

$$f'(x) = 2 \cdot x$$

$$f(x) = x^{10}$$

$$f'(x) = 10 \cdot x^9$$

$$f(x) = x^{250}$$

$$f'(x) = 250 \cdot x^{249}$$

$$f(x) = x^{2a}$$

$$f'(x) = 2a \cdot x^{2a-1}$$

$$f(x) = x^{a+b}$$

$$f'(x) = (a+b) \cdot x^{a+b-1}$$

$$f(x) = x^{4k-s}$$

$$f'(x) = (4k-s) \cdot x^{4k-s-1}$$

$$f(x) = x^{k+1}$$

$$f'(x) = (k+1) \cdot x^{(k+1)-1}$$

$$f'(x) = (k+1) \cdot x^k$$

$$f(x) = x^{2m-1}$$

$$f'(x) = (2m-1) \cdot x^{(2m-1)-1}$$

$$f'(x) = (2m-1) \cdot x^{2m-2}$$

$$f(x) = x^{n-5}$$

$$f'(x) = (n-5) \cdot x^{(n-5)-1}$$

$$f'(x) = (n-5) \cdot x^{n-6}$$

$$f(x) = x^{-4+n}$$

$$f'(x) = (-4+n) \cdot x^{(-4+n)-1}$$

$$f'(x) = (n-4) \cdot x^{n-5}$$

$$f(x) = x^{2(k+1)}$$

$$f'(x) = 2(k+1) \cdot x^{2(k+1)-1}$$

$$f'(x) = 2(k+1) \cdot x^{2k+1}$$

$$f(x) = x^{-(n+1)}$$

$$f'(x) = -(n+1) \cdot x^{-(n+1)-1}$$

$$f'(x) = -(n+1) \cdot x^{-n-2}$$

$$f(x) = x \leftrightarrow f(x) = x^1$$

$$f'(x) = 1 \cdot x^{1-1} = x^0$$

$$f'(x) = 1$$

$$f(x) = \frac{1}{x} \leftrightarrow f(x) = x^{-1}$$

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

$$f'(x) = (-1) \cdot x^{-2} = \frac{-1}{x^2}$$

$$f(x) = \frac{1}{x^5} \leftrightarrow f(x) = x^{-5}$$

$$f'(x) = (-5) \cdot x^{-5-1}$$

$$f'(x) = (-5) \cdot x^{-6} = \frac{-5}{x^6}$$

$$f(x) = 2x \leftrightarrow f(x) = 2x^1$$

$$f'(x) = 2 \cdot x^{1-1} = x^0$$

$$f'(x) = 2$$

$$f(x) = \frac{1}{x^a} \leftrightarrow f(x) = x^{-a}$$

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

$$f'(x) = \frac{-a}{x^{a+1}}$$

$$f(x) = \frac{x^3}{x^5} \leftrightarrow f(x) = x^{-2}$$

$$f'(x) = (-2) \cdot x^{-2-1}$$

$$f'(x) = (-2) \cdot x^{-3} = \frac{-2}{x^3}$$

$$f(x) = \sqrt{x} \leftrightarrow f(x) = x^{\frac{1}{2}}$$

$$f(x) = \sqrt[3]{x} \leftrightarrow f(x) = x^{\frac{1}{3}}$$

$$f'(x) = \frac{1}{2} \cdot x^{\frac{1}{2}-1} = \frac{1}{2} \cdot x^{-\frac{1}{2}}$$

$$f'(x) = \frac{1}{3} \cdot x^{\frac{1}{3}-1} = \frac{1}{3} \cdot x^{-\frac{2}{3}}$$

$$f'(x) = \frac{1}{2} \cdot \frac{1}{x^{\frac{1}{2}}} = \frac{1}{2\sqrt{x}}$$

$$f'(x) = \frac{1}{3} \cdot \frac{1}{x^{\frac{2}{3}}} = \frac{1}{3\sqrt[3]{x^2}}$$

Hinweis: $a^0 = 1$, somit $x^0 = 1$

Stichworte zu diesem Thema: Differenzialrechnung, Ableitung, Potenzregel, Faktorregel, Summenregel, Konstantenregel, Aufgaben, Beispiele, Lösungsweg, 1.Ableitung, Steigung, Kurvendiskussion, Abitur