Ableiten mit CAS

Arbeitsblatt

1 Gib die Definitionsmenge an und bilde die Ableitung.

a) $f(x) = 10\sqrt{4x + 1}$ b) $f(t) = 6\sqrt{t^2 - t}$ c) $y(x) = (\sqrt{x} - 3x)^2$

d) $A(s) = \sqrt{10s^2 + 4}$ e) $h(v) = (v^2 - 2)\cdot\sqrt{3v}$ f) $u(b) = \frac{b - 1}{\sqrt{b}}$

g) $f(x) = \sqrt{3x + 2}$ h) $y(x) = (2x - 3)\cdot\sqrt{3x^2 + 4x}$ i) $g(s) = \sqrt{s^2 + s - 12}$

2 Bilde die Ableitung.

a) $y(x) = 10\cdot e^{3x^2}$ b) $f(n) = e^{2n}\cdot n^2$ c) $f(x) = \frac{0{,}5^x}{x}$

d) $\varphi(x) = \frac{1}{\sqrt{2\pi}}e^{-0{,}5x^2}$ e) $f(t) = \frac{2000}{1 + 19\cdot e^{-0{,}02t}}$ f) $Q(t) = Q_0\cdot e^{-\frac{1}{R\cdot C}\cdot(t - t_0)}$

3 Bilde die Ableitung.

a) $y(t) = \frac{1}{12}\cdot\ln(3t^2)$ b) $f(x) = x\cdot\ln(x)$ c) $n(x) = \frac{\ln(x)}{x - 1}$

d) $y(x) = {}^5\log(x^2 - 1)$ e) $s(t) = \frac{1}{4}t\cdot\lg(2t)$ f) $a(n) = n\cdot{}^2\log(3n)$

4 Bilde die Ableitung.

a) $h(t) = \frac{2}{\sqrt{5t}}$ b) $f(r) = \sqrt[3]{7 - r^2}$ c) $N(t) = e^{-2t}\cdot t^{3{,}5}$

d) $h(c) = \sqrt[4]{(2c^3 - 4)^3}$ e) $A(x) = (10x^2 - x)^{-1{,}5}$ f) $f(x) = \sqrt{\frac{3}{(2x - 1)^5}}$

5 Gib die Definitionsmenge an und bilde die Ableitung.

a) $f(x) = \sin\left(4x + \frac{\pi}{3}\right)$ b) $s(t) = \frac{\cos(t)}{t}$ c) $a(t) = 10\cdot e^{-0{,}2t}\cdot\sin(t)$

d) $f(t) = \sin^2(t) + \cos^2(t)$ e) $f(x) = \cos\left(\frac{1}{x}\right)$ f) $f(\varphi) = \sqrt{\tan(2\varphi)}$

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Arbeitsblatt – Lösungen

1

a) $D = \left\{x \in \mathbb{R} \,\middle|\, x > -\frac{1}{4}\right\},\ f'(x) = \frac{20}{\sqrt{4x+1}}$

b) $D = \{x \in \mathbb{R} \mid x > 1 \vee x < 0\},\ f'(t) = \frac{3(2t-1)}{\sqrt{x^2 - x}}$

c) $D = \mathbb{R}^+,\ y'(x) = 1 - 9\sqrt{x} + 18x$

d) $D = \mathbb{R},\ A'(s) = \frac{10s}{\sqrt{10s^2+4}}$

e) $D = \mathbb{R}^+,\ h'(v) = 2 \cdot v\sqrt{3v} + \frac{\sqrt{3}\cdot(v^2-2)}{2\cdot\sqrt{v}} = \frac{\sqrt{3}\cdot(5v^2-2)}{2\cdot\sqrt{v}}$

f) $D = \mathbb{R}^+,\ u'(b) = \frac{b+1}{2\cdot b\sqrt{b}}$

g) $D = \left\{x \in \middle| \mathbb{R}\, x > -\frac{2}{3}\right\},\ f'(x) = \frac{3}{2\cdot\sqrt{3x+2}}$

h) $D = \left\{x \in \middle| \mathbb{R}\, x > 0 \vee x < -\frac{4}{3}\right\},\ y'(x) = 2\cdot\sqrt{3x^2+4x} + \frac{(2x-3)\cdot(3x+2)}{\sqrt{3x^2+4x}} = \frac{12x^2+3x-6}{\sqrt{3x^2+4x}}$

i) $D = \{s \in \mathbb{R} \mid s > 3 \vee s < -4\},\ g'(s) = \frac{2s+1}{2\cdot\sqrt{s^2+s-12}}$

2

a) $y'(x) = 60x\cdot e^{3x^2}$

b) $f'(n) = e^{2n}\cdot(2n^2+2n)$

c) $f'(x) = 0{,}5^x\cdot\left(\frac{\ln(0{,}5)}{x} - \frac{1}{x^2}\right)$

d) $\varphi'(x) = -\frac{x}{\sqrt{2\pi}}e^{-0{,}5x^2}$

e) $f'(t) = \frac{760\cdot e^{-0{,}02t}}{(1+19\cdot e^{-0{,}02t})^2}$

f) $Q'(t) = \frac{-Q_0}{R\cdot C}\cdot e^{-\frac{1}{R\cdot C}(t-t_0)}$

3

a) $y'(t) = \frac{1}{6t}$

b) $f'(x) = \ln(x) + 1$

c) $n'(x) = \frac{x - x\cdot\ln(x) - 1}{x\cdot(x-1)^2}$

d) $y'(x) = \frac{2x}{\ln(5)\cdot(x^2-1)} \approx 1{,}24\cdot\frac{x}{x^2-1}$

e) $s'(t) = \frac{1}{4}\cdot\lg(2t) + \frac{1}{4\cdot\ln(10)} \approx \frac{1}{4}\cdot\lg(2t) + 0{,}11$

f) $a'(n) = {}^2\log(3n) + \frac{1}{\ln(2)} \approx {}^2\log(3n) + 1{,}44$

4

a) $h'(t) = \frac{-1}{t\cdot\sqrt{5t}}$

b) $f'(r) = \frac{-2r}{3\cdot\sqrt[3]{(7-r^2)^2}}$

c) $N'(t) = -2\cdot e^{-2t}\cdot t^{3{,}5} + 3{,}5\cdot e^{-2t}\cdot t^{2{,}5}$

d) $h'(c) = \frac{9c^2}{2\cdot\sqrt[4]{2c^3-4}}$

e) $A'(x) = -1{,}5\,(20x-1)\,(10x^2-x)^{-2{,}5}$

f) $f'(x) = -5\cdot\sqrt{\frac{3}{(2x-1)^7}}$

5

a) $D = \mathbb{R},\ f'(x) = 4\cdot\cos\left(4x + \frac{\pi}{3}\right)$

b) $D = \mathbb{R}\setminus\{0\},\ s'(t) = \frac{-\cos(t) - t\cdot\sin(t)}{t^2}$

c) $D = \mathbb{R},\ a'(t) = -2\cdot e^{-0{,}2t}\left(\sin(t) + 5\cdot\cos(t)\right)$

d) $D = \mathbb{R},\ f'(t) = 0$

e) $D = \mathbb{R}\setminus\{0\},\ f'(x) = \frac{\sin\left(\frac{1}{x}\right)}{x^2}$

f) $D = \mathbb{R}\setminus\left\{\dots, -\frac{3\pi}{2}, -\frac{\pi}{2}, \frac{\pi}{2}, \frac{3\pi}{2}, \frac{5\pi}{2}, \dots\right\},\ f'(\varphi) = \frac{1+\tan^2(2\varphi)}{\sqrt{\tan(2\varphi)}}$