

Übungen zur Vorlesung Mathematik für Ingenieure I

Übung 8: Differentialrechnung

Wintersemester 2016/2017

1 Differentialrechnung

1.1 Bilden Sie die erste Ableitung

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|--|--|----------------------------------|
| a) $y = x^7$ | b) $y = x^{-4}$ | c) $y = \frac{1}{x^{-4}}$ |
| d) $y = x^{-\frac{12}{7}}$ | e) $y = \frac{1}{\sqrt{x}}$ | f) $y = \sqrt[4]{x} \sqrt[3]{x}$ |
| g) $y = \sqrt{\sqrt{x}}$ | h) $y = \frac{\sqrt[6]{x^5} \sqrt[3]{x^4}}{\sqrt[12]{x^{11}}}$ | i) $y = 3x^{-3}$ |
| j) $y = \frac{3}{x^2}$ | k) $y = 7\sqrt[7]{x^5}$ | l) $y = 17 \sqrt[25]{2x^{-1}}$ |
| m) $y = 4x^5 + 3x^4 + 12x^3 + 7x^2 + 3x - 1$ | | |

1.2 Berechnen Sie $f'(x_0)$

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|--|----------------------|
| a) $y = 3x^2 - 5x + 2$ | $x_0 = \frac{1}{12}$ |
| b) $y = 8x^5 - 3x^4 + 2x^3 - 3x^2 + 8x - 17$ | $x_0 = -1$ |
| c) $y = \sqrt[4]{5x^3} - \sqrt[5]{4x^4} + \sqrt[6]{5x^5} - 5x^{-\frac{1}{5}} + 8x^{\frac{1}{3}}$ | $x_0 = 1$ |

1.3 Berechnen Sie $f'(x)$

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|---|-------------------------------------|
| a) $y = (x-5)(2x+2)$ | b) $y = (2x+4)(2x+4)$ |
| c) $y = (3x^2 - 2x + 1)(9x^2 + x - 1)$ | d) $y = \frac{x+1}{x-1}$ |
| e) $y = (4x^2 - 1)(3x^2 + 5)$ | f) $y = (x^2 - 6x + 9)(x^2 - 9)$ |
| g) $y = \tan^2 x$ | h) $y = \ln x^3$ |
| i) $y = \frac{\sin x \cos x}{x^2}$ | j) $y = (\ln x)^2 x^3$ |
| k) $y = (4 - 8x)^8$ | l) $y = (x^9 - 1)^{-2}$ |
| m) $y = (x-1)^{\frac{1}{4}}$ | n) $y = (x^3 - 4)^8$ |
| o) $y = (x - \frac{3}{x})^2$ | p) $y = \sqrt{x-1}$ |
| q) $y = \left(\frac{x^5-1}{x+3}\right)^3$ | r) $y = \frac{\sqrt{x^2+5}}{2x-13}$ |

1.4 Berechnen Sie $f'(x_0)$

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|--|---------------------|-----------------------------------|------------|
| a) $y = (x-2)(4x^2 + 3x + 6)$ | $x_0 = \frac{1}{4}$ | b) $y = \sqrt{x^3}(x-2)^2$ | $x_0 = 4$ |
| c) $y = \frac{2x-3}{x-5}$ | $x_0 = -2$ | d) $y = \frac{6+5x+x^2}{(x+3)^2}$ | $x_0 = -1$ |
| e) $y = \frac{2-3x}{2+x} - \frac{1+4x}{1-x} - \frac{x^2-14x}{x^2+x-2}$ | $x_0 = 3$ | | |

1.5 Berechnen Sie $f'(x)$

- a) $y = \frac{x}{x - \sqrt{9+x^2}}$ b) $y = \sin 2x$
c) $y = \sin(3 + 4x)$ d) $y = \frac{1}{\sin 2x}$
e) $y = \frac{2}{\sqrt{\sin x}}$ f) $y = \cos x^2$
g) $y = \cos^2 \sqrt{x}$ h) $y = \tan 9x$
g) $y = \tan(5 - 9x)$ h) $y = \frac{5}{\sqrt{3 \tan x}}$

1.6 Berechnen Sie $f'(x_0)$

- a) $y = (x - 2)(4x^2 + 3x + 6)$ $x_0 = \frac{1}{4}$ b) $y = \ln \frac{x+1}{x-1}$ $x_0 = 2$
c) $y = \ln \sqrt{\frac{x+1}{x-1}}$ $x_0 = 2$ d) $y = \ln \sqrt{\frac{2+x^3}{2-3x}}$ $x_0 = \frac{\sqrt{2}}{3}$

Durchführung mit Abgabe bis Di, 29.11.2016, 23.59 Uhr