

# Aufgabenblatt Ableitungen

## Tangente und Normale

### Differenzialrechnung Lösungen

Level 1 – Grundlagen – Blatt 2

#### Lösung A1

Detaillierte Lösung für a)

Bestimmung von  $f'(x)$

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

Bestimmung von  $f(u)$  für  $u = -2$

$$f(-2) = -\frac{1}{2}$$

Bestimmung von  $f'(u)$  für  $u = -2$

$$f'(-2) = -\frac{1}{4}$$

Aufstellung der Tangentengleichung

$$t(x) = f'(u) \cdot (x - u) + f(u)$$

$$t(x) = -\frac{1}{4} \cdot (x + 2) - \frac{1}{2}$$

$$t(x) = -\frac{1}{4}x - 1$$

Aufstellung der Normalengleichung

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

$$n(x) = 4 \cdot (x + 2) - \frac{1}{2}$$

b)  $f(x) = \frac{1}{x^2}; \quad u = 4$

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

$$f'(4) = -\frac{1}{32}$$

$$f(4) = \frac{1}{16}$$

$$t(x) = -\frac{1}{32}(x - 4) + \frac{1}{16}$$

$$n(x) = 32(x - 4) + \frac{1}{16}$$

$$t(x) = -\frac{1}{32}x + \frac{3}{16}$$

$$n(x) = 32x - \frac{1023}{16}$$

c)  $f(x) = x - \frac{1}{x^3}; \quad u = 1$

$$f'(x) = 1 + \frac{3}{x^4}$$

$$f'(1) = 4$$

$$f(1) = 0$$

$$t(x) = 4(x - 1) + 0$$

$$n(x) = -\frac{1}{4}(x - 1) + 0$$

$$t(x) = 4x - 4$$

$$n(x) = -\frac{1}{4}x + \frac{1}{4}$$

d)  $f(x) = -3x(x + 1)(x - 1) + 1; \quad u = 0$

$$f'(x) = -9x^2 + 3$$

$$f'(0) = 3$$

$$f(0) = 1$$

$$t(x) = 3x + 1$$

$$n(x) = -\frac{1}{3}x + 1$$

#### Lösung A2

$$f(x) = \frac{3}{4}x^2 - 3x$$

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

a) I)  $f'(-1) = -\frac{9}{2}$  II)  $f'(1) = -\frac{3}{2}$

III)  $f'(2) = 0$

IV)  $f'(4) = 3$

V)  $f'(-2) = -7$

b) I)  $f(-1) = \frac{15}{4}$

$$t_{-1}(x) = -\frac{9}{2}(x + 1) + \frac{15}{4}$$

$$t_{-1}(x) = -\frac{9}{2}x - \frac{3}{4}$$

II)  $f(1) = -\frac{9}{4}$

$$t_1(x) = -\frac{3}{2} \cdot (x - 1) - \frac{9}{4}$$

$$t_1(x) = -\frac{3}{2}x - \frac{3}{4}$$

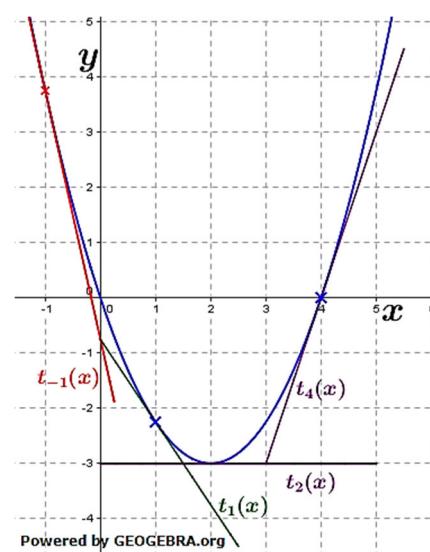
III)  $f(2) = -3$

$$t_2(x) = -3$$

IV)  $f(4) = 0$

$$t_4(x) = 3(x - 4)$$

$$t_4(x) = 3x - 12$$



# Aufgabenblatt Ableitungen

## Tangente und Normale

## Lösungen

### Level 1 – Grundlagen – Blatt 2

#### Lösung A2

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

a) I)  $-\frac{1}{f'(0,5)} = \frac{1}{15}$  II)  $f'(\sqrt[3]{2}) = 0$

V)  $-\frac{1}{f'(-3)} = -\frac{27}{29}$

b) I)  $f(0,5) = \frac{9}{2}$

$$n_{0,5}(x) = \frac{1}{15}(x - 0,5) + \frac{9}{2}$$

$$n_{0,5}(x) = \frac{1}{15}x + \frac{67}{15}$$

II)  $f(\sqrt[3]{2}) = 1,89$

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

III)  $f(3) = \frac{28}{9}$

$$n_3(x) = -\frac{27}{25}(x - 3) + \frac{28}{9}$$

IV)  $f(-1) = 0$

$$n_4(x) = -\frac{1}{3}x + \frac{1}{3}$$

V)  $f(-3) = -\frac{26}{9}$

$$n_5(x) = -\frac{27}{29}(x + 3) - \frac{26}{9}$$

$$n_5(x) = -\frac{27}{29}x - \frac{1483}{261}$$

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

III)  $-\frac{1}{f'(3)} = -\frac{27}{25}$  IV)  $-\frac{1}{f'(-1)} = -\frac{1}{3}$

