Lösungen Differenzialrechnung I

1.

a) $f'(x) = 18x^2 - 6$

b) $f'(x) = 4x - \dfrac{4}{x^2}$

c) $f'(x) = \dfrac{3}{\sqrt{x}} - 3$

d) $f'(x) = 2\cos(x) - 3$

e) $f'(x) = 8x^3 - 9x^2 + 4x$

f) $f'(x) = x \cdot \cos(x) + \sin(x)$

g) $f'(x) = (x^2 + 2x) \cdot e^x$

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

i) $f'(x) = \dfrac{4x}{(x^2 + 1)^2}$

j) $f'(x) = \dfrac{-x^2 + 4x}{(x-2)^2}$

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

l) $f'(x) = \dfrac{(x-1)e^x}{x^2}$

m) $f'(x) = 4x^3 + 4x$

n) $f'(x) = \dfrac{9x + 10}{2\sqrt{3x+5}}$

o) $f'(x) = 3 \cdot \cos(3x)$

p) $f'(x) = \dfrac{2x}{(1-x)^3}$

q) $f'(x) = \dfrac{3x \cdot \cos(3x^2)}{\sqrt{\sin(3x^2)}}$

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

2.

a) $m = 8$

b) $\alpha_{x_1} \approx -76{,}0°$; $\alpha_{x_2} \approx 82{,}9°$; $\alpha_{x_3} \approx 82{,}9°$; $\alpha_y \approx 14{,}0°$

c) $t(x) = -x + 2$; $n(x) = x + 4$

d) $P_1\left(-\sqrt{\dfrac{4}{3}} \,\middle|\, \dfrac{8}{3}\sqrt{\dfrac{4}{3}}\right)$; $P_1\left(\sqrt{\dfrac{4}{3}} \,\middle|\, -\dfrac{8}{3}\sqrt{\dfrac{4}{3}}\right)$

e) $Q_1\left(-\sqrt{\dfrac{5}{3}} \,\middle|\, \dfrac{7}{3}\sqrt{\dfrac{5}{3}}\right)$; $Q_2\left(\sqrt{\dfrac{5}{3}} \,\middle|\, -\dfrac{7}{3}\sqrt{\dfrac{5}{3}}\right)$

3. $a_1 = \dfrac{1}{4}$; $a_2 = -\dfrac{1}{4}$

4. $S_1\left(\dfrac{\pi}{6} \,\middle|\, 2\right)$; $S_2\left(\dfrac{5\pi}{6} \,\middle|\, 2\right)$; $\alpha \approx 79{,}1°$