Lösungen S. 60

A1

a) $f'(x) = 4(x+2)^3$ b) $f'(x) = 24(8x+2)^2$ c) $f'(x) = -15\cdot(\frac{1}{2}-5x)^2$

d) $f'(x) = x\cdot(x^2-5)$ e) $f'(x) = -8(8x-7)^{-2}$ f) $f'(x) = 4\cdot(5-x)^{-5}$

g) $f'(x) = -30(15x-3)^{-3}$ h) $f'(x) = -2\cdot(15x-3x^2)^{-3}\cdot(15-6x)$

A2

a) $f'(x) = -\frac{2}{(x-1)^3}$ b) $f'(x) = -\frac{6}{(3x-1)^3}$ c) $f'(x) = -\frac{6}{(x-1)^3}$

d) $f'(x) = -\frac{2}{3}\cdot(x-1)^{-3}$ e) $f'(x) = 2\cdot\cos(2x)$ f) $f'(x) = 2\cdot\cos(2x+\pi)$

g) $f'(x) = 2\cdot\sin(1-x)$ h) $f'(x) = 2x\cos(x^2)$

A3

a) $f'(x) = \boxed{8}\cdot\cos(4x)$

$g'(x) = \boxed{-6}\cdot(1-3x)^{\boxed{3}}$

b) $f'(x) = \cancel{4}\,(5-2x)^3$
-8

$g'(x) = \cancel{-}\,4\cdot\sin(1-x)$
$+$

A4

a) $f'(x) = 0{,}5\cdot\cos(2x+\pi)$ b) $f'(x) = -2\cos(\pi-3x)$

c) $f'(x) = 2x\cdot\sin(x^2+1)$ d) $f'(x) = -\frac{2}{3}\sin(x)\cdot\cos(x)$

e) $f'(x) = \frac{3}{2}\cdot\frac{1}{\sqrt{3x}}$ f) $f'(x) = \frac{1}{2}\cdot\frac{1}{\sqrt{3+x}}$

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

i) $f'(x) = \frac{-\cos(x)}{\sin^2(x)} = -\frac{\cos(x)}{(\sin(x))^2}$

A5

a) $f(x) = \frac{1}{9}(3x+2)^3$ $f'(x) = \frac{1}{3}(3x+2)^2\cdot 3 = (3x+2)^2 = 9x^2+12x+4$

$f'(2) = (3\cdot 2+2)^2 = 8^2 = \underline{\underline{64}}$

b) $f'(x) \stackrel{!}{=} 0 = (3x+2)^2 \Rightarrow x = -\frac{2}{3}$ An der Stelle $x = -\frac{2}{3}$ ließe sich eine waagrechte Tangente zeichnen. $Q(-\frac{2}{3}/0)$

c) $f'(x) \stackrel{!}{=} 1 = 9x^2+12x+4$

$0 = 9x^2+12x+3 \quad |:9$

$0 = x^2+\frac{4}{3}x+\frac{1}{3}$

$x_{1/2} = -\frac{2}{3} \pm \sqrt{\frac{4}{9}-\frac{3}{9}}$

$x_1 = -\frac{2}{3}+\sqrt{\frac{1}{9}} = -\frac{1}{3}$

$x_2 = -\frac{2}{3}-\frac{1}{3} = -1$

In den Punkten $R(-\frac{1}{3}/\frac{1}{9})$ und $S(-1/-\frac{1}{3})$ hat die Tangente die Steigung 1.

A6

$f'(x) = 3\cdot(0{,}5x-1)^2\cdot 0{,}5 = \frac{3}{2}(\frac{1}{2}x-1)^2 = \frac{3}{2}\cdot[\frac{1}{2}(x-2)]^2$

↳ Parabel ist um 2 nach rechts verschoben!

$\Rightarrow$ Fig. 3 $y = i(x)$