Lösung A1

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

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

c) $f'(x) = 2sin(2x) \cdot 2cos(2x) = 4\,sin(2x)\,cos(2x)$

d) $f'(x) = -8 \cdot 3 \cdot \left(\sqrt{3x+1}\right)^{-4} \cdot \frac{3}{2\cdot\sqrt{3x+1}} = -36 \cdot \left(\sqrt{3x+1}\right)^{-5}$

e) $f'(x) = \frac{-2\,sin(x)cos(x)}{2\cdot\sqrt{1-sin^2(x)}} = -\frac{sin(x)\cdot cos(x)}{\sqrt{1-sin^2(x)}}$

f) $f'(x) = cos(\sqrt{1-x}) \cdot \left(-\frac{1}{2\cdot\sqrt{1-x}}\right) = -\frac{cos(\sqrt{1-x})}{2\cdot\sqrt{1-x}}$

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

h) $f'(x) = 2x\sqrt{x} + \frac{x^2}{2\sqrt{x}} = \frac{5}{2}x \cdot \sqrt{x}$

i) $f'(x) = 2\sqrt{x} + \frac{2x-1}{2\sqrt{x}} = \frac{6x-1}{2\sqrt{x}}$

j) $g'(t) = 8t\sqrt{t} + \frac{4t^2-1}{2\sqrt{t}} = \frac{20t^2-1}{2\sqrt{t}}$

k) $g'(a) = \frac{1-a}{2\sqrt{a}} - \sqrt{a} = \frac{1-3a}{2\sqrt{a}}$

l) $h'(z) = \frac{z^2-1}{2\sqrt{z}} + 2z\sqrt{z} = \frac{5z^2-1}{2\sqrt{z}}$

Lösung A2

a) $f'(x) = 1 - 12x$

b) $f'(x) = x(5x^3 - 12x + 2)$

c) $f'(t) = -12t^3 - 3t^2 + 1$

d) $f'(x) = 2x - 4x^3$

e) $f'(x) = -\frac{6x^2-8x-10}{5}$

f) $h'(r) = 4r(r^2+1)$

Lösung A3

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

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

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

d) $f'(x) = cos(x) - xsin(x)$

e) $f'(x) = 2x \cdot sin(x) + (x^2+1) \cdot cos(x)$

f) $g'(x) = \frac{cos(x)}{2\sqrt{x}} - \sqrt{x}sin(x) = -\frac{2xsin(x)-cos(x)}{2\sqrt{x}}$

g) $g'(t) = cos^2(t) - sin^2(t)$

h) $g'(t) = 2sin(t) \cdot cos(t)$

i) $g'(t) = -2sin(t) \cdot cos(t)$

Lösung A4

a) $f'(x) = m$

b) $f'(x) = 2ax$

c) $s'(t) = gt$

d) $f'(x) = t(2x-1)$

e) $f'(t) = x^2 - x$

f) $g'(z) = 0$

g) $f'(x) = g(x) + x \cdot g'(x)$

h) $f'(x) = 2g(x) \cdot g'(x)$

i) $f'(x) = g''(x) \cdot g(x) + \left(g'(x)\right)^2$