

### Aufgabe 1

$$f(x) = x^{0,5}$$

$$f'(x) = \lim_{h \rightarrow 0} (x + h - x^{0,5}) / h \quad // \text{ Erweitern mit } (x + h - x^{0,5})$$

$$f'(x) = \lim_{h \rightarrow 0} (x + h - x) / (h((x + h)^{0,5} + x^{0,5}))$$

$$f'(x) = \lim_{h \rightarrow 0} 1 / ((x + h)^{0,5} + x^{0,5})$$

$$\underline{\underline{f'(x) = 1 / (2 * x^{0,5})}}$$

### Aufgabe 2

a)

$$f(x) = 2x^{10} + 2x^3 - 7x - 1$$

$$\underline{\underline{f'(x) = 20x^9 + 6x^2 - 7}}$$

b)

$$f(x) = (2x + 3)^3 \Rightarrow \text{ Kettenregel}$$

$$f'(x) = g'(h(x)) * h'(x)$$

$$g'(x) = 3(h(x))^2$$

$$h'(x) = 2$$

$$\underline{\underline{f'(x) = 6(2x + 3)^2}}$$

c)

$$f(x) = 5 / x^{10} \Rightarrow \text{ Quotientenregel}$$

$$g'(x) = 0$$

$$h'(x) = 10x^9$$

$$f'(x) = (x^{10} * 0 - 5 * 10^9) / (x^{10})^2$$

$$\underline{\underline{f'(x) = -(50x^9) / x^{20}}}$$

d)

$$f(x) = x^{1,5} + 1,5x$$

$$\underline{\underline{f'(x) = 1,5x^{0,5} + 1,5}}$$

e)

$$f(x) = 3\sin(x) + 5\cos(x)$$

$$\underline{\underline{f'(x) = 3\cos(x) - 5\sin(x)}}$$

f)

$$f(x) = x^{3/7}$$

$$\underline{\underline{f'(x) = (3 / 7)x^{-(4/7)}}}$$

### Aufgabe 3

$$f(x) = \cos(x) - x$$

Intervall [a, b]	Ergebnis f(a) f(b)
[0, 1]	$f(0) = 1$ $f(1) = -0,4596976941$
$[-0,4596976941, 1]$	$f(-0,4596976941) = 1,355884359$ $f(1) = -0,4596976941$
$[-0,4596976941, 1,355884359]$	$f(-0,4596976941) = 1,355884359$ $f(1,355884359) = -1,142622937$
$[-1,142622937, 1,355884359]$	$f(-1,142622937) = 1,557832719$ $f(1,355884359) = -1,142622937$
$[-1,142622937, 1,557832719]$	$f(-1,142622937) = 1,557832719$ $f(1,557832719) = -1,544869474$

Genau auf 1 Stelle nach dem Komma (1,5).