

## Ausführliche Lösungen Differenzialrechnung III

### Ausführliche Lösungen:

A1	Ausführliche Lösungen
a)	$f(x) = \frac{4}{5}x^2 - \frac{3}{4}x + \frac{1}{2} \Rightarrow f'(x) = \frac{8}{5}x - \frac{3}{4}$
b)	$f(x) = -\frac{3}{7}x^2 + \frac{4}{9}x + \frac{8}{10} \Rightarrow f'(x) = -\frac{6}{7}x + \frac{4}{9}$
c)	$f(x) = x^3 - x^2 + x + 1 \Rightarrow f'(x) = 3x^2 - 2x + 1$
d)	$f(x) = -x^3 + x^2 - x + 7 \Rightarrow f'(x) = -3x^2 + 2x - 1$
e)	$f(x) = -\frac{3}{4}x^3 + 2x^2 - x + 1 \Rightarrow f'(x) = -\frac{9}{4}x^2 + 4x - 1$
f)	$f(x) = -\frac{2}{3}x^3 + \frac{3}{2}x^2 + 2x + \pi \Rightarrow f'(x) = -2x^2 + 3x + 2$
g)	$f(x) = 4x^3 + \pi x^2 + bx + c \Rightarrow f'(x) = 12x^2 + 2\pi x + b$
h)	$f(x) = ax^3 + bx^2 + cx + d \Rightarrow f'(x) = 3ax^2 + 2bx + c$
i)	$f(x) = \frac{1}{\sqrt{2}}x^3 - \frac{1}{\pi}x^2 + \alpha x \Rightarrow f'(x) = \frac{3}{\sqrt{2}}x^2 - \frac{2}{\pi}x + \alpha$
j)	$f(x) = \frac{4}{5}x^3 - \frac{3}{4}x^2 + 4x + 7 \Rightarrow f'(x) = \frac{12}{5}x^2 - \frac{3}{2}x + 4$
A2	Ausführliche Lösungen
a)	$f(x) = x^4 - 2x^2 + 3x + 1 \Rightarrow f'(x) = 4x^3 - 4x + 3$
b)	$f(x) = 2x^4 + 3x^2 - 2x + 2 \Rightarrow f'(x) = 8x^3 + 6x - 2$
c)	$f(x) = \frac{1}{2}x^4 + \frac{1}{2}x^2 - x + 1 \Rightarrow f'(x) = 2x^3 + x - 1$
d)	$f(x) = -\frac{1}{4}x^4 + \frac{1}{3}x^3 - \frac{1}{2}x^2 \Rightarrow f'(x) = -x^3 + x^2 - x$
e)	$f(x) = x^5 - 2x^4 + x^2 - 1 \Rightarrow f'(x) = 5x^4 - 8x^3 + 2x$
f)	$f(x) = \frac{3}{4}x^4 + \frac{5}{7}x^2 + 7 \Rightarrow f'(x) = 3x^3 + \frac{10}{7}x$
g)	$f(x) = 1 \Rightarrow f'(x) = 0$
h)	$f(x) = 0 \Rightarrow f'(x) = 0$
i)	$f(x) = 2x^6 - 4x^4 + 2x^2 \Rightarrow f'(x) = 12x^5 - 16x^3 + 4x$
j)	$f(x) = \frac{3}{4}x^3 + \frac{2}{3}x^2 - x + 4 \Rightarrow f'(x) = \frac{9}{4}x^2 + \frac{4}{3}x - 1$

A3	Ausführliche Lösungen
a)	$f(x) = \frac{4}{3}x^3 + \frac{3}{2}x^2 + \sqrt{2} \cdot x \Rightarrow f'(x) = 4x^2 + 3x + \sqrt{2}$
b)	$f(x) = \sqrt{3} \cdot x^3 - \sqrt{2} \cdot x^2 + 1 \Rightarrow f'(x) = 3\sqrt{3} \cdot x^2 - 2\sqrt{2} \cdot x$
c)	$f(x) = \frac{4}{3\pi}x^3 + \frac{1}{3}x^2 + 1 \Rightarrow f'(x) = \frac{4}{\pi}x^2 + \frac{2}{3}x$
d)	$f(x) = 3,5x^2 - 1,5x + 2 \Rightarrow f'(x) = 7x - 1,5$
e)	$f(x) = 0,5x^2 - 2,5x + 1 \Rightarrow f'(x) = x - 2,5$
f)	$f(x) = 3,1x^2 + \frac{7}{2}x - 7 \Rightarrow f'(x) = 6,2x + 3,5$
g)	$f(x) = 1,5x^3 - 2,5x^2 + 1 \Rightarrow f'(x) = 4,5x^2 - 5x$
h)	$f(x) = -2,5x^3 + 1,5x^2 - 1 \Rightarrow f'(x) = -7,5x^2 + 3x$
i)	$f(x) = t \cdot x^3 + 2x^2 - 4x \Rightarrow f'(x) = 3tx^2 + 4x - 4$
j)	$f(x) = 7,2x^2 - 8,2x + b \Rightarrow f'(x) = 14,4x - 8,2$

A4	Ausführliche Lösungen
a)	$f(x) = x^{-1} \Rightarrow f'(x) = -x^{-2} = -\frac{1}{x^2}$
b)	$f(x) = \frac{1}{x} = x^{-1} \Rightarrow f'(x) = -x^{-2} = -\frac{1}{x^2}$
c)	$f(x) = \frac{2}{3x} + 2 = \frac{2}{3}x^{-1} \Rightarrow f'(x) = -\frac{2}{3}x^{-2} = -\frac{2}{3x^2}$
d)	$f(x) = 2x^{-2} + 3x^{-1} + 2 \Rightarrow f'(x) = -4x^{-3} - 3x^{-2}$
e)	$f(x) = -\frac{1}{2}x^{-2} + 2x^{-1} \Rightarrow f'(x) = x^{-3} - 2x^{-2}$
f)	$f(x) = x^{\frac{1}{3}} \Rightarrow f'(x) = \frac{1}{3}x^{\frac{1}{3}-1} = \frac{1}{3}x^{-\frac{2}{3}}$
g)	$f(x) = x^{\frac{1}{4}} \Rightarrow f'(x) = \frac{1}{4}x^{\frac{1}{4}-1} = \frac{1}{4}x^{-\frac{3}{4}}$
h)	$f(x) = \sqrt{x} = x^{\frac{1}{2}} \Rightarrow f'(x) = \frac{1}{2}x^{\frac{1}{2}-1} = \frac{1}{2}x^{-\frac{1}{2}}$
i)	$f(x) = \frac{1}{\sqrt{x}} = \frac{1}{x^{\frac{1}{2}}} = x^{-\frac{1}{2}} \Rightarrow f'(x) = -\frac{1}{2}x^{-\frac{1}{2}-1} = -\frac{1}{2}x^{-\frac{3}{2}}$
j)	$f(x) = \sqrt{x^3} = x^{\frac{3}{2}} \Rightarrow f'(x) = \frac{3}{2}x^{\frac{3}{2}-1} = \frac{3}{2}x^{\frac{1}{2}}$