

# Lösungsblatt

## Arbeitsblatt 1

- a)  $f'(x) = -0,7 \cdot 3 \cdot x^2 = -21x^2$

c)  $f'(x) = \pi \cdot 2 \cdot x = 2\pi x$

b)  $f'(x) = 4 \cdot 5 \cdot x^4 = 20x^4$

d)  $f'(x) = \frac{1}{4} \cdot 4 \cdot x^3 = x^3$
- a)  $f'(x) = 5x^4 + 4x^3$

c)  $f'(x) = 6x^4 + 2x^9$

b)  $f'(x) = -6x + 27x^2$

d)  $f'(x) = 3\pi x^2 + 4 \cdot (\pi - 1) \cdot x^3$
- a)  $f'(x) = -3 \cdot 2 \cdot x^1 + 0 - 6 \cdot 5 \cdot x^4 = -6x - 30x^4$

b)  $f'(x) = 5 \cdot 1 \cdot x^0 - 6 \cdot 4 \cdot x^3 + 0 = 5 - 24x^3$

c)  $f'(x) = \pi \cdot 1 \cdot x^0 - 0 + \frac{1}{6} \cdot 6x^5 = \pi + x^5$

## Arbeitsblatt 2

- 1/2. a)  $f(x) = 7 \cdot x^{\frac{1}{2}}; f'(x) = 7 \cdot \frac{1}{2} \cdot x^{-\frac{1}{2}} = \frac{7}{2} \cdot x^{-\frac{1}{2}} = \frac{7}{2 \cdot \sqrt{x}}$
- b)  $f(x) = -9 \cdot x^{\frac{1}{3}}; f'(x) = -9 \cdot \frac{1}{3} \cdot x^{-\frac{2}{3}} = -\frac{3}{x^{\frac{2}{3}}} = -\frac{3}{\sqrt[3]{x^2}}$
- c)  $f(x) = \frac{1}{3} \cdot x^{-4}; f'(x) = \frac{1}{3} \cdot (-4) \cdot x^{-5} = -\frac{4}{3} \cdot x^{-5} = -\frac{4}{3x^5}$
- d)  $f(x) = -4 \cdot x^{-6}; f'(x) = -4 \cdot (-6) \cdot x^{-7} = 24 \cdot x^{-7} = \frac{24}{x^7}$
3. a)  $f(x) = x^2 + x^{-1}; f'(x) = 2x - x^{-2} = 2x - \frac{1}{x^2}$
- b)  $f(x) = x^{-2} + 7x; f'(x) = -2 \cdot x^{-3} + 7 = -\frac{2}{x^3} + 7$
- c)  $f(x) = -3 \cdot x^{-3} + \frac{1}{5} \cdot x^{-5}; f'(x) = 9x^{-4} - x^{-6} = \frac{9}{x^4} - \frac{1}{x^6}$
- d)  $f(x) = x^{\frac{1}{3}} + \frac{1}{2}x^2; f'(x) = \frac{1}{3}x^{-\frac{2}{3}} + x = \frac{1}{3 \cdot \sqrt[3]{x^2}} + x$
- e)  $f(x) = -4 \cdot x^{\frac{1}{4}} + 5; f'(x) = -x^{-\frac{3}{4}} = -\frac{1}{\sqrt[4]{x^3}}$
- f)  $f(x) = -0,5x^2 + 7 \cdot x^{\frac{1}{7}}; f'(x) = -x + x^{-\frac{6}{7}} = -x + \frac{1}{\sqrt[7]{x^6}}$
- g)  $f(x) = 4 \cdot x^{-\frac{1}{2}} - 6; f'(x) = -2 \cdot x^{-\frac{3}{2}} = \frac{-2}{\sqrt{x^3}}$
- h)  $f(x) = 5 + 9 \cdot x^{-\frac{1}{3}}; f'(x) = -3 \cdot x^{-\frac{4}{3}} = -\frac{3}{\sqrt[3]{x^4}}$
- i)  $f(x) = 19x - 6 \cdot x^{-\frac{1}{6}}; f'(x) = 19 + x^{-\frac{7}{6}} = 19 + \frac{1}{\sqrt[6]{x^7}}$
- j)  $f(x) = \frac{5}{3} \cdot x^{-\frac{6}{5}} + x; f'(x) = -2 \cdot x^{-\frac{11}{5}} + 1 = -\frac{2}{\sqrt[5]{x^{11}}} + 1$
- k)  $f(x) = 2 \cdot x^{-1} - \frac{3}{7} x^{-\frac{7}{3}}; f'(x) = -2 \cdot x^{-2} + x^{-\frac{10}{3}} = \frac{-2}{x^2} + \frac{1}{\sqrt[3]{x^{10}}}$
- l)  $f(x) = -\pi + 2,35 \cdot x^{-\frac{5}{2}} + \pi x; f'(x) = 0 - 2,35 \cdot 2,5 \cdot x^{-\frac{7}{2}} + \pi = -\frac{5,875}{\sqrt{x^7}} + \pi$

### Arbeitsblatt 3

1.	f(x)	1. $x^3$	2. $\sqrt{x}$	3. $\frac{1}{x}$	4. $2x^2 - x$	5. $x + \frac{1}{x}$	6. $\sqrt{x} + x^2$
	f'(x)	B) $3x^2$	A) $\frac{1}{2\sqrt{x}}$	f) $-\frac{1}{x^2}$	C) $4x - 1$	E) $1 - \frac{1}{x^2}$	D) $\frac{1}{2\sqrt{x}} + 2x$

2.	GA4: f(x)	I) $x^3 + x^2$	II) $x^{-4}$	III) $x^{-3}$	IV) $-\frac{1}{8}x^4 + x^2$	V) $-\frac{1}{3}x^3 + x$	VI) $-x^3 + x^2$
	GA5: f'(x)	e) $3x^2 + 2x$	c) $-4x^{-5}$	f) $-3x^{-4}$	b) $-\frac{1}{2}x^3 + 2x$	a) $-x^2 + 1$	d) $-3x^2 + 2x$

3./ 4.

Ausgangsfunktion	1	4	6	8	11	12	f(x)		1	2	6	8	9	12	f(x)
Ableitungsfunktion	7	2	9	10	3	5	f'(x)		4	3	10	11	7	5	f'(x)

5.

f(x)	I) $x^3 + x^2$	II) $x^{-3} - x^2$	III) $-\frac{1}{3}x^3 - x^2$	IV) $-\frac{1}{4}x^2 + x^{-2}$	V) $-x^{-3} + x^2$	VI) $x^3 - x^2$
f'(x)	d) $3x^2 + 2x$	i) $-3x^{-4} - 2x$	g) $-x^2 - 2x$	e) $-\frac{1}{2}x - \frac{2}{x^3}$	h) $3x^{-4} + 2x$	b) $3x^2 - 2x$

Es tauchen nicht auf: a, c, f.