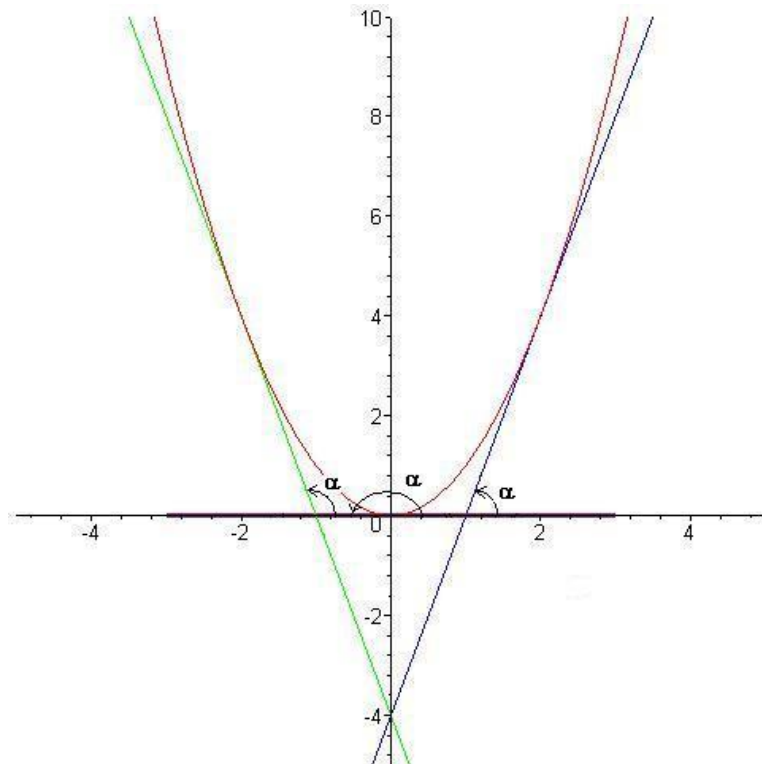


Differentialrechnung 1 (Lösungen)

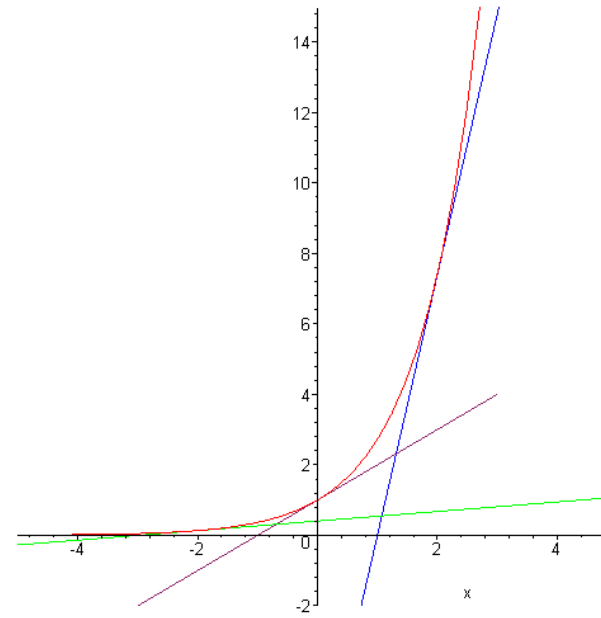
1. a) $6x_0$ b) $3x_0^2 - 4x_0$ c) $\frac{1}{2\sqrt{x_0}}$

d) $\frac{x_0^2 - 1}{x_0^2}$ e) $\frac{-1}{(x_0 - 1)^2}$

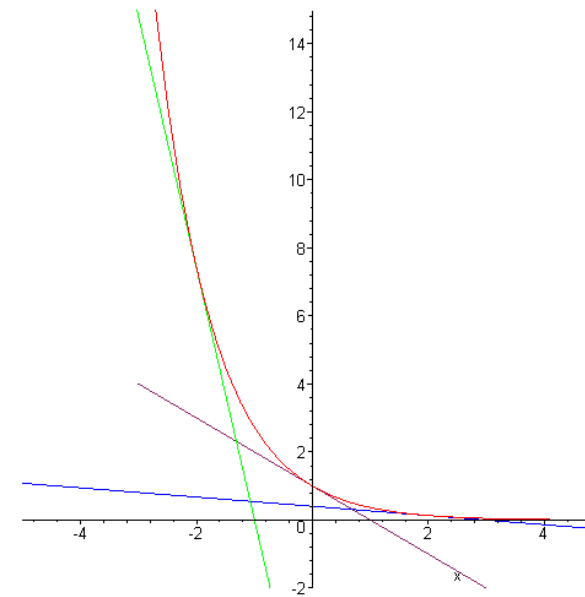
2. a)



b)



c)

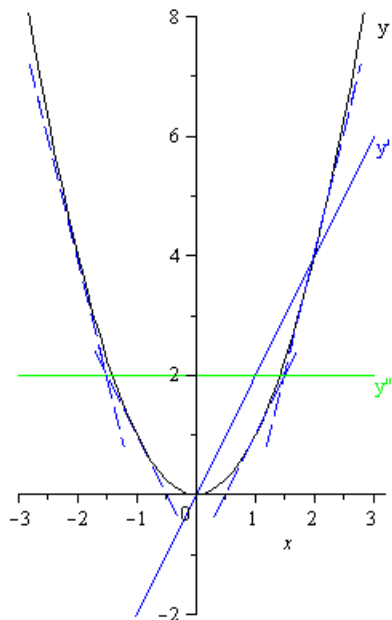


3. a) $-2x^3 + x^2 - 4x - \frac{1}{x^2}$ b) $3a^2x^2 - 2\sqrt{b}x + \frac{1}{2}c$
 c) $10x^{-6} - 9x^{-4} + x^{-3}$ d) $4ax(ax^2 - b)$
 e) $-\frac{1}{3x^2} - \frac{2}{3x^3}$ f) $\frac{x^4 + 2x^3 + 3x^2 - 2x - 1}{(x^2 + x + 1)^2}$
 g) $4 - \frac{2x}{(x^2 + 1)^2}$ h) $\frac{1 - \ln x}{x^2}$
 i) $\cos x \cdot \ln x + \frac{\sin x}{x}$ j) $x(2 \ln x + 1)$
 k) $\frac{10}{x}$

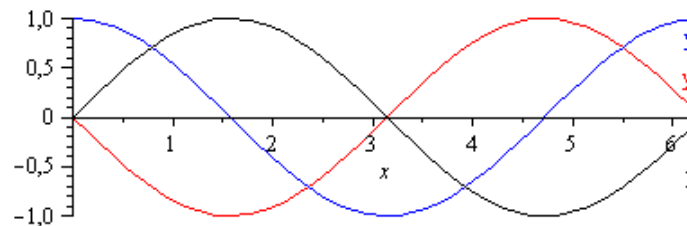
4.

- a) $y' = 20x^3 + \frac{1}{x} + e^x$ b) $y' = 2e^x - 2x$
 $y'' = 60x^2 - \frac{1}{x^2} + e^x$ $y'' = 2e^x - 2$
 $y''' = 120x + \frac{2}{x^3} + e^x$ $y''' = 2e^x$

5. a)



b)



6. a) $2x \cdot z^x + x^2 \cdot z^x \ln z$ b) -1 c) $x^3 \cdot z^{x-1} + 2$

7. a) $\frac{x}{\sqrt{x^2 - 1}}$ b) $-\frac{1}{\sqrt{1 - 2x}}$
 c) $\frac{2 \ln x}{x}$ d) $\frac{1}{2x}$
 e) $x e^{\sqrt{x}} \left(2 + \frac{1}{2} \sqrt{x} \right)$ f) $e^{-x} (2e^{-x} - 1)$
 g) $10x (\sin 2x + x \cos 2x)$ h) $2 \sin x \cos x = \sin 2x$
 i) $\frac{2}{\sin 2x}$ j) $\frac{1}{x \ln x}$
 k) $\frac{1}{1 - x^2}$ l) $\frac{1}{\sqrt{x^2 - a}}$