

8.0.

$$f(x_1, x_2) = (x_1 - 1.5)^2 + (x_2 - 1)^4$$

NR:

u. d. N

$$-1 + x_1 + x_2 \leq 0 \quad (g_1)$$

$$-1 + x_1 - x_2 \leq 0 \quad (g_2)$$

$$-1 - x_1 + x_2 \leq 0 \quad (g_3)$$

$$-1 - x_1 - x_2 \leq 0 \quad (g_4)$$

$$x_2^3 - 3x_2^2 - 1^3 + 3x_2$$

$$\begin{aligned} L(x, \lambda) = & (x_1 - 1.5)^2 + (x_2 - 1)^4 + \lambda_1(-1 + x_1 + x_2) + \lambda_2(-1 + x_1 - x_2) \\ & + \lambda_3(-1 - x_1 + x_2) + \lambda_4(-1 - x_1 - x_2) \end{aligned}$$

$$\nabla_x L(x, \lambda) = \begin{pmatrix} 2(x_1 - 1.5) + \lambda_1 + \lambda_2 - \lambda_3 - \lambda_4 \\ 4(x_2 - 1)^3 + \lambda_1 - \lambda_2 + \lambda_3 - \lambda_4 \end{pmatrix} \stackrel{!}{=} 0$$

$$= \nabla f(x) = \begin{pmatrix} 2(x_1 - 1.5) \\ 4(x_2 - 1)^3 \end{pmatrix} + \lambda_1 \begin{pmatrix} 1 \\ 1 \end{pmatrix} + \lambda_2 \begin{pmatrix} 1 \\ -1 \end{pmatrix} + \lambda_3 \begin{pmatrix} -1 \\ 1 \end{pmatrix} + \lambda_4 \begin{pmatrix} -1 \\ -1 \end{pmatrix} \stackrel{!}{=} 0$$

1. Fall)

$$\lambda_{1,2,3,4} = 0$$

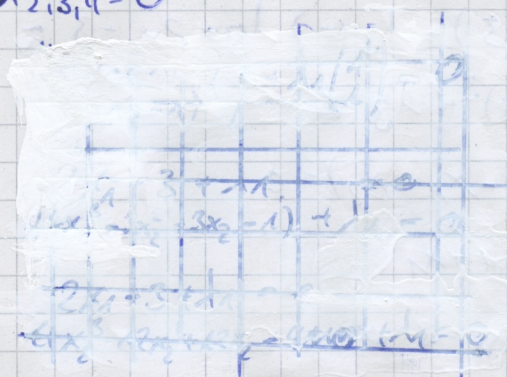
$$x_1 = 1.5$$

$$x_2 = 1$$

$$\hookrightarrow (g_1)$$

2. Fall)

$$\lambda_{2,3,4} = 0$$



$$2x_1 - 3 + \lambda_1 = 0 \Leftrightarrow \lambda_1 = -2x_1 + 3$$

$$4(x_2 - 1)^3 + \lambda_1 = 0$$

$$x_1(-1 + x_1 + x_2) = 0 \quad | : \lambda_1$$

$$x_2 = +1 - x_1$$

$$4(-x_1)^3 + \lambda_1 = 0$$

$$-4x_1^3 - 2x_1 + 3 = 0 \quad x_1 \approx 0.728082123068$$

 KKT
Punkt
↓

 g_1 ist
aktiv
Bedingung.

$$\nabla_x L(x_1, x_2) = 0$$

$$x_2 = +1 - x_1 \approx 0.2719178769$$

$$\text{für } x_1 \approx 0.728082123068 \text{ und } x_2 \approx 0.2719178769$$