

Exercises on the active-set method

Solve the following constrained optimization problems by using the active-set method starting from the point x^0 .

$$1. \quad \begin{cases} \min & \frac{1}{2}x_1^2 + x_1x_2 + x_2^2 + 4x_1 - 5x_2 \\ & -x_1 \leq 0 \\ & x_1 \leq 1 \\ & x_1 - x_2 \leq 0 \\ & x_2 \leq 3 \end{cases} \quad x^0 = (1, 1)$$

$$2. \quad \begin{cases} \min & \frac{3}{2}x_1^2 + \frac{1}{2}x_2^2 - 2x_1 + 3x_2 + 7 \\ & -x_1 \leq 0 \\ & x_1 \leq 1 \\ & x_1 - x_2 \leq 0 \\ & x_2 \leq 3 \end{cases} \quad x^0 = \left(\frac{1}{2}, 3\right)$$

$$3. \quad \begin{cases} \min & \frac{3}{2}x_1^2 + 2x_1x_2 + 2x_2^2 + x_1 - 2x_2 \\ & -x_1 \leq 0 \\ & x_1 \leq 1 \\ & x_1 - x_2 \leq 0 \\ & x_2 \leq 3 \end{cases} \quad x^0 = (1, 3)$$

$$4. \quad \begin{cases} \min & \frac{1}{2}x_1^2 + 2x_1x_2 + \frac{5}{2}x_2^2 + 3x_1 - 2x_2 \\ & -x_1 + x_2 \leq 0 \\ & x_2 \leq 0 \\ & 2x_1 + x_2 \leq 2 \\ & -x_2 \leq 2 \end{cases} \quad x^0 = (2, -2)$$

$$5. \quad \begin{cases} \min & x_1^2 - x_1x_2 + \frac{3}{2}x_2^2 + 2x_1 \\ & -x_1 + x_2 \leq 0 \\ & x_2 \leq 0 \\ & 2x_1 + x_2 \leq 2 \\ & -x_2 \leq 2 \end{cases} \quad x^0 = (2, -2)$$

$$6. \begin{cases} \min \frac{5}{2} x_1^2 - 2 x_1 x_2 + \frac{1}{2} x_2^2 - 3 x_1 - x_2 \\ -x_1 + x_2 \leq 0 \\ x_2 \leq 0 \\ 2 x_1 + x_2 \leq 2 \\ -x_2 \leq 2 \end{cases} \quad x^0 = (-2, -2)$$