

Problems 2 and 6 are for homework. Solutions must be submitted before the next lecture (not tutorial!) to be evaluated. Students are not allowed to keep submitted solutions after evaluation.

Problem 1. Find all vertices and edges of a polyhedron determined by the following conditions.

$$\begin{aligned}x_1 + x_2 + x_3 &\leq 8 \\x_1 &\leq 6 \\x_2 + x_3 &\leq 4 \\x_1, x_2, x_3 &\geq 0\end{aligned}$$

Problem 2. Find all vertices and edges of a polyhedron determined by the following conditions.

$$\begin{aligned}2x_1 + x_2 + x_3 &\leq 14 \\2x_1 + 5x_2 + 5x_3 &\leq 30 \\x_1, x_2, x_3 &\geq 0\end{aligned}$$

Problem 3. Solve the following problem

$$\begin{aligned}\text{Maximize } &x_1 + 2x_2 \\ \text{subject to } &x_1 + 3x_2 + x_3 = 4 \\ &2x_2 + x_3 = 2 \\ &x_1, x_2, x_3 \geq 0.\end{aligned}$$

Problem 4. Solve the following problem

$$\begin{aligned}\text{Maximize } &x_1 + 2x_2 \\ \text{subject to } &x_1 - x_2 \leq 2 \\ &-x_1 + x_2 \leq 1 \\ &2x_1 + x_2 \leq 7 \\ &x_1, x_2 \geq 0.\end{aligned}$$

Problem 5. Solve the following problem

$$\begin{aligned}\text{Maximize } &x_1 + 2x_2 - x_3 \\ \text{subject to } &2x_1 + x_2 + x_3 \leq 14 \\ &4x_1 + 2x_2 + 3x_3 \leq 28 \\ &2x_1 + 5x_2 + 5x_3 \leq 30 \\ &x_1, x_2, x_3 \geq 0\end{aligned}$$

Problem 6. Solve the following problem

$$\begin{aligned}\text{Maximize } &2x_1 - x_2 + 2x_3 \\ \text{subject to } &2x_1 + x_2 \leq 10 \\ &x_1 + 2x_2 - 2x_3 \leq 20 \\ &x_2 + 2x_3 \leq 5 \\ &x_1, x_2, x_3 \geq 0\end{aligned}$$