

Suggested Problems

Set 3

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Problem 1

Show that the following problems are bounded.

1. **maximize** $4x_1 + 2x_2 + 3x_3$
subject to

$$x_1 + x_2 + x_3 \leq 5$$

$$x_1, x_2, x_3 \geq 0$$

2. **maximize** $4x_1 - 2x_2 + 3x_3$
subject to

$$x_1 + x_2 + x_3 \leq 5$$

$$x_1, x_2, x_3 \geq 0$$

Problem 2

Show that the following problems are unbounded.

1. **maximize** $4x_1 + 2x_2 + 3x_3$
subject to

$$x_1 + x_2 - x_3 \leq 5$$

$$x_1, x_2, x_3 \geq 0$$

2. **maximize** $3x_1 + x_2 + x_3 + x_4$
subject to

$$x_1 + x_2 \leq 1$$

$$x_1 + x_3 \leq 1$$

$$x_1 - x_4 \leq 1$$

$$x_1, x_2, x_3, x_4 \geq 0$$

Problem 3

Write the following dictionaries in the tableau format and pivot once.

- $$\begin{aligned}x_4 &= 2 - x_1 - 3x_2 - x_3 \\x_5 &= 4 - x_1 + x_3 \\x_6 &= 10 - x_2 - 2x_3 \\z &= 7 + 2x_1 - x_2 - x_3\end{aligned}$$
- $$\begin{aligned}x_1 &= 3 - x_2 + x_3 - x_5 \\x_4 &= 4 - x_3 \\x_6 &= 3 - x_2 - x_5 \\z &= 1 - x_2 + 2x_3 + x_5\end{aligned}$$
- $$\begin{aligned}x_1 &= 4 - 2x_2 - x_3 + 2x_5 \\x_4 &= 5 - x_2 + x_3 - x_5 \\x_6 &= 4 + x_2 - x_3 + 2x_5 \\z &= 7 + 2x_2 - x_3 - x_5\end{aligned}$$