

## Simplex Pivot Sequence Example

<https://arxiv.org/pdf/math/0012242>

## Original Linear Program

Maximize  $z = 2.3x_1 + 2.15x_2 - 13.55x_3 - 0.4x_4$   
subject to  $0.4x_1 + 0.2x_2 - 1.4x_3 - 0.2x_4 \leq 0,$   
 $- 7.8x_1 - 1.4x_2 + 7.8x_3 + 0.4x_4 \leq 0,$   
 $x_i \geq 0 \quad \text{for } i = 1, \dots, 4.$

## Add Slack Variables

$$x_5 = -0.4x_1 - 0.2x_2 + 1.4x_3 + 0.2x_4,$$

$$x_6 = 7.8x_1 + 1.4x_2 - 7.8x_3 - 0.4x_4,$$

$$z = 2.3x_1 + 2.15x_2 - 13.55x_3 - 0.4x_4.$$

## Table-01

$$x_5 = -0.4x_1 - 0.2x_2 + 1.4x_3 + 0.2x_4,$$

$$x_6 = 7.8x_1 + 1.4x_2 - 7.8x_3 - 0.4x_4,$$

$$z = 2.3x_1 + 2.15x_2 - 13.55x_3 - 0.4x_4.$$

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Table-01

$$x_5 = -0.4x_1 - 0.2x_2 + 1.4x_3 + 0.2x_4,$$

$$x_6 = 7.8x_1 + 1.4x_2 - 7.8x_3 - 0.4x_4,$$

$$z = 2.3x_1 + 2.15x_2 - 13.55x_3 - 0.4x_4.$$

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Table-02

$$x_1 = -0.5x_2 + 3.5x_3 + 0.5x_4 - 2.5x_5,$$

$$x_6 = -2.5x_2 + 19.5x_3 + 3.5x_4 - 19.5x_5,$$

$$z = x_2 - 5.5x_3 + 0.75x_4 - 5.75x_5.$$

## Table-02

$$x_1 = -0.5x_2 + 3.5x_3 + 0.5x_4 - 2.5x_5,$$

$$x_6 = -2.5x_2 + 19.5x_3 + 3.5x_4 - 19.5x_5,$$

$$z = x_2 - 5.5x_3 + 0.75x_4 - 5.75x_5.$$

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Table-02

$$\begin{aligned}x_1 &= -0.5x_2 + 3.5x_3 + 0.5x_4 - 2.5x_5, \\x_6 &= -2.5x_2 + 19.5x_3 + 3.5x_4 - 19.5x_5, \\z &= x_2 - 5.5x_3 + 0.75x_4 - 5.75x_5.\end{aligned}$$

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Table-03

$$\begin{aligned}x_2 &= 7.8x_3 + 1.4x_4 - 7.8x_5 - 0.4x_6, \\x_1 &= -0.4x_3 - 0.2x_4 + 1.4x_5 + 0.2x_6, \\z &= 2.3x_3 + 2.15x_4 - 13.55x_5 - 0.4x_6.\end{aligned}$$

## Table-03

$$x_2 = 7.8x_3 + 1.4x_4 - 7.8x_5 - 0.4x_6,$$

$$x_1 = -0.4x_3 - 0.2x_4 + 1.4x_5 + 0.2x_6,$$

$$z = 2.3x_3 + 2.15x_4 - 13.55x_5 - 0.4x_6.$$

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Table-03

$$\begin{aligned}x_2 &= 7.8x_3 + 1.4x_4 - 7.8x_5 - 0.4x_6, \\x_1 &= -0.4x_3 - 0.2x_4 + 1.4x_5 + 0.2x_6, \\z &= 2.3x_3 + 2.15x_4 - 13.55x_5 - 0.4x_6.\end{aligned}$$

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Table-04

$$\begin{aligned}x_3 &= -2.5x_1 - 0.5x_4 + 3.5x_5 + 0.5x_6, \\x_2 &= -19.5x_1 - 2.5x_4 + 19.5x_5 + 3.5x_6, \\z &= -5.75x_1 + x_4 - 5.5x_5 + 0.75x_6.\end{aligned}$$

Table-04

$$x_3 = -2.5x_1 - 0.5x_4 + 3.5x_5 + 0.5x_6,$$

$$x_2 = -19.5x_1 - 2.5x_4 + 19.5x_5 + 3.5x_6,$$

$$z = -5.75x_1 + x_4 - 5.5x_5 + 0.75x_6.$$

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Table-04

$$\begin{aligned}x_3 &= -2.5x_1 - 0.5x_4 + 3.5x_5 + 0.5x_6, \\x_2 &= -19.5x_1 - 2.5x_4 + 19.5x_5 + 3.5x_6, \\z &= -5.75x_1 + x_4 - 5.5x_5 + 0.75x_6.\end{aligned}$$

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Table-05

$$\begin{aligned}x_4 &= -7.8x_1 - 0.4x_2 + 7.8x_5 + 1.4x_6, \\x_3 &= 1.4x_1 + 0.2x_2 - 0.4x_5 - 0.2x_6, \\z &= -13.55x_1 - 0.4x_2 + 2.3x_5 + 2.15x_6.\end{aligned}$$

Table-05

$$x_4 = -7.8x_1 - 0.4x_2 + 7.8x_5 + 1.4x_6,$$

$$x_3 = 1.4x_1 + 0.2x_2 - 0.4x_5 - 0.2x_6,$$

$$z = -13.55x_1 - 0.4x_2 + 2.3x_5 + 2.15x_6.$$

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Table-05

$$\begin{aligned}x_4 &= -7.8x_1 - 0.4x_2 + 7.8x_5 + 1.4x_6, \\x_3 &= 1.4x_1 + 0.2x_2 - 0.4x_5 - 0.2x_6, \\z &= -13.55x_1 - 0.4x_2 + 2.3x_5 + 2.15x_6.\end{aligned}$$

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Table-06

$$\begin{aligned}x_5 &= -2.5x_3 + 3.5x_1 + 0.5x_2 - 0.5x_6, \\x_4 &= 19.5x_1 + 3.5x_2 - 19.5x_3 - 2.5x_6, \\z &= -5.5x_1 + 0.75x_2 - 5.75x_3 + x_6.\end{aligned}$$

## Table-06

$$x_5 = -2.5x_3 + 3.5x_1 + 0.5x_2 - 0.5x_6,$$

$$x_4 = 19.5x_1 + 3.5x_2 - 19.5x_3 - 2.5x_6,$$

$$z = -5.5x_1 + 0.75x_2 - 5.75x_3 + x_6.$$

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Table-06

$$x_5 = -2.5x_3 + 3.5x_1 + 0.5x_2 - 0.5x_6,$$

$$x_4 = 19.5x_1 + 3.5x_2 - 19.5x_3 - 2.5x_6,$$

$$z = -5.5x_1 + 0.75x_2 - 5.75x_3 + x_6.$$

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Table-07

$$x_5 = -0.4x_1 - 0.2x_2 + 1.4x_3 + 0.2x_4,$$

$$x_6 = 7.8x_1 + 1.4x_2 - 7.8x_3 - 0.4x_4,$$

$$z = 2.3x_1 + 2.15x_2 - 13.55x_3 - 0.4x_4.$$

Table-07

$$\begin{aligned}x_5 &= -0.4x_1 - 0.2x_2 + 1.4x_3 + 0.2x_4, \\x_6 &= 7.8x_1 + 1.4x_2 - 7.8x_3 - 0.4x_4, \\z &= 2.3x_1 + 2.15x_2 - 13.55x_3 - 0.4x_4.\end{aligned}$$

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Table-01

$$\begin{aligned}x_5 &= -0.4x_1 - 0.2x_2 + 1.4x_3 + 0.2x_4, \\x_6 &= 7.8x_1 + 1.4x_2 - 7.8x_3 - 0.4x_4, \\z &= 2.3x_1 + 2.15x_2 - 13.55x_3 - 0.4x_4.\end{aligned}$$