

Problem 1

Consider the following problem:

$$\text{Maximize: } Z = x_1 + 2x_2$$

$$\text{Subject To: } x_1 + 3x_2 \leq 8$$

$$x_1 + x_2 \leq 4$$

$$\text{With: } x_1, x_2 \geq 0$$

Solve using the tabular simplex method.

Source: Hillier & Lieberman 4.4.2

Problem 2

Consider the following problem:

$$\text{Maximize: } Z = 5x_1 + 9x_2 + 7x_3$$

$$\text{Subject To: } x_1 + 3x_2 + 2x_3 \leq 10$$

$$3x_1 + 4x_2 + 2x_3 \leq 12$$

$$2x_1 + x_2 + 2x_3 \leq 8$$

$$\text{With: } x_1, x_2, x_3 \geq 0$$

Solve using the algebraic simplex method.

Source: Hillier & Lieberman 4.4.5

Problem 3

Consider the following problem:

$$\text{Maximize: } Z = 5x_1 + x_2 + 3x_3 + 4x_4$$

$$\text{Subject To: } x_1 - 2x_2 + 4x_3 + 3x_4 \leq 20$$

$$-4x_1 + 6x_2 + 5x_3 - 4x_4 \leq 40$$

$$2x_1 - 3x_2 + 3x_3 + 8x_4 \leq 50$$

$$\text{With: } x_1, x_2, x_3, x_4 \geq 0$$

Work through the simplex method step-by-step to demonstrate that Z is unbounded.

Source: Hillier & Lieberman 4.5.4

Problem 3.1415

Sir Galahad spent some time counting his coconuts the other day and realized that what he really wanted was some maple syrup. The trouble is, living in England in the 13th century, there wasn't much in the way of maple syrup. The nearest source of maple syrup is located 3100 miles away in what would be known as Vermont. Galahad realizes that he won't only need to supply himself with Maple Syrup, he has to answer the following questions before he moves on with his burgeoning Maple Syrup company (Sir Galahad's Glad I Had Syrup!TM):

(a) Which of the Knights of the Round Table will want Maple Syrup?

(b) Given the number of Knights in question 3.1415a and the average speed of an unladen African swallow, what price and size should Galahad set the bottles of maple syrup?

(c) Are you a lumberjack, and are you ok?

Source: A Strange Friday Afternoon Stream Of Consciousness Thing with Monty Python.