

CLASS TEST MEMO

Decision Support Systems I (North-West University)



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QUESTION 1/VRAAG 1

Consider the following linear programming model:

Beskou die volgende lineêre programmeringsmodel:

Maximise
$$Z = 3x_1 + 9x_2$$

subject to:
 $2x_1 + 8x_2 = 48$
 $2x_1 + 4x_2 \le 32$
 $x_2 \ge 2$
 $x_1, x_2 \ge 0$

1.1. Convert the constraints to equalities by adding the appropriate variables.

1.1. Skakel die beperkings om na gelykhede deur die toepaslike veranderlikes by te voeg.

$$2x_1 + 8x_2 + 0S_1 + 0S_2 + 1A_1 + 0A_2 = 48$$

$$2x_1 + 4x_2 + 1S_1 + 0S_2 + 0A_1 + 0A_2 = 32$$

$$0x_1 + x_2 + 0S_1 - 1S_2 + 0A_1 + 1A_2 = 2$$

$$x_1, x_2, S_1, S_2, A_1, A_2 \ge 0$$

1.2. Add the new variables (in question 1.1) into the objective function with the appropriate coefficients.

1.2. Voeg die nuwe veranderlikes (in vraag 1.1) by die doelfunksie met die toepaslike koëffisiënte.

Maximise
$$Z = 3x_1 + 9x_2 + 0S_1 + 0S_2 - MA_1 - MA_2$$

QUESTION 2/VRAAG 2

Consider the first tableau of a linear programming model below:

2.1. Copy the tableau and complete the missing values.

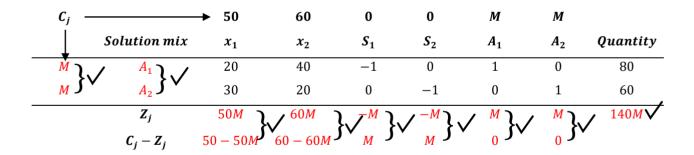
Beskou die eerste tableau van 'n lineêre programmeringsmodel onder:

2.1. Skryf die tableau oor en voltooi die ontbrekende waardes.

(9)

(8)

(4)



2.2. Which variable will enter the basis next?

2.3. Which variable will leave the basis next?

2.4. Solve the problem using the simplex method. Please use fractional notation (e.g. ½) in the case of non-integers.

2.2. Watter veranderlike sal die basis volgende inkom?

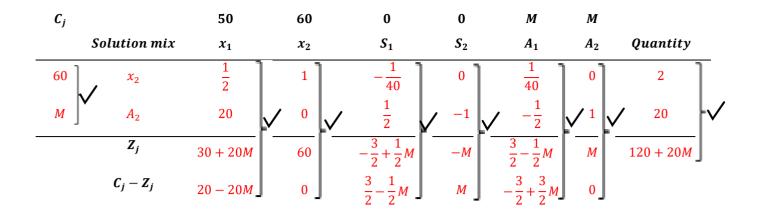
2.3. Watter veranderlike sal die basis volgende verlaat?

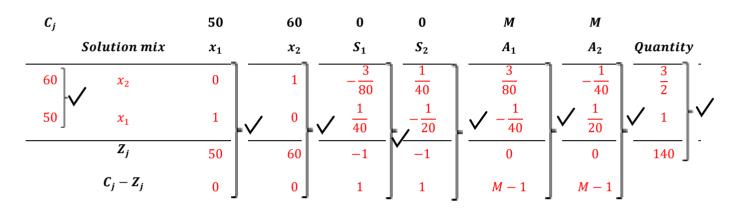
(1)

(1)

2.4. Los die probleem op met behulp van die simpleksmetode. Gebruik asseblief fraksionele notasie (bv. ½) in geval van breuke.

(17)





Final solution: $x_1 = 1, x_2 = \frac{3}{2}, Z = 140$

TOTAL/TOTAAL: 40

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