QUIZ4.simplex_method_tut4_solution

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QUIZ4.simplex_metho...

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Mar.18 2021 Week 10

Instuction: You will have 30 minutes to finish quiz and will have 5 minutes to submit the quiz to Crowdmark after the quiz has finished. You will need to keep your cameras on during the quiz and submission times. One hand-held calculator is allowed. Electronic devices, online calculators, notes and other aids are not allowed. Violation of the instruction can be considered as an academic misconduct, and will be reported to the instructor and the department immediately.

Question

Consider the following complex tableaux that happens at one intermediate step when solving a LPP using simplex algorithm using the notation from lectures and tutorials.

x_1	x_2	x_3	x_4	x_5	x_6	
0	1	1	0	1	4	5
1	1	1	0	0	−1	1
0	2	0	1	0	2	3
0	−14	−3	0	0	4	−28

1. (3 points) What are the current BFS and the current cost? What are the basic variables and non-basic variables? You dont have to show your work for this question, a correct final answer will be granted full mark.

- Current basic feasible solution: (1, 0, 0, 3, 5, 0) ← 1 point
- Current cost: 28 ← 1 point
- Basic variables: x_1, x_4, x_5 ← ½ points
- Non-basic variables: x_2, x_3, x_6 ← ½ points

2. (7 points) Find the optimal solution and the optimal cost using the simplex algorithm on the above tableaux. Clearly indicate the current BFSs and current costs for every intermediate tableauxes, and make sure to explain why you reach the optimal solution. Make sure to clearly show how you used the simplex algorithm, including but not limited to the reason why you pick certain entry.

2 points
2 points

0	1	1	0	1	4	5
1	1	1	0	0	−1	1
0	2	0	1	0	2	3
0	−14	−3	0	0	4	−28

$\frac{5}{4} < \frac{6}{4}$ ✓ ; × ; $\frac{3}{2} = \frac{6}{4}$

1 point

The objective row has no positive entry, so we reach the optimal solution $x = \begin{pmatrix} 0 \\ \frac{9}{4} \\ 0 \\ 0 \\ \frac{3}{4} \\ \frac{21}{4} \end{pmatrix}$ and optimal cost is 33.

→ 0	$\frac{1}{4}$	$\frac{1}{4}$	0	$\frac{1}{4}$	1	$\frac{5}{4}$
1	$\frac{1}{4}$	$\frac{5}{4}$	0	$\frac{1}{4}$	0	$\frac{9}{4}$
0	$\frac{6}{4}$	$-\frac{2}{4}$	1	$-\frac{2}{4}$	0	$\frac{3}{2}$
0	−15	−4	0	−1	0	−33

2 points

current BFS $x = \begin{pmatrix} \frac{9}{4} \\ 0 \\ 0 \\ \frac{3}{2} \\ 0 \\ \frac{15}{4} \end{pmatrix}$ with current cost 33