Coursework template CO343

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1 Problem 1

The problem states that we should find x that solves the following equation

$$2x^2 + 4x - 6 = 0\,. \tag{1}$$

We take the standard algorithm for solving equations of the form ax^2+bx+c and apply it to Equation 1. This gives us

$$x = \frac{2}{2\cdot 2} \pm \sqrt{\left(\frac{2}{2\cdot 2}\right)^2 + \frac{6}{2}} \tag{2}$$

$$= 1 \pm 2 \tag{3}$$

So the solutions are $x = 3$ and $x = -1$.

In Figure 1, we can see an example of a galaxy.

Figure 1: Example figure

2 Problem 2

Example of Simplex tableau:

BV	z	x_1	x_2	x_3	x_4	x_5	RHS
z	1	0	0	$-\frac{2}{5}$	$-\frac{1}{5}$	0	-8
x_2	0	0	1	$-\frac{1}{5}$	$\frac{2}{5}$	0	5
x_5	0	0	0	$-\frac{3}{5}$	$\frac{1}{5}$	1	1
x_1	0	1	0	$\frac{3}{5}$	$-\frac{1}{5}$	0	3

(4)

We can define the LaTeX commands `Tstrut` and `Bstrut` to get more spacing between rows in the tableau and make it look nicer:

BV	z	x_1	x_2	x_3	x_4	x_5	RHS
z	1	0	0	$-\frac{2}{5}$	$-\frac{1}{5}$	0	-8
x_2	0	0	1	$-\frac{1}{5}$	$\frac{2}{5}$	0	5
x_5	0	0	0	$-\frac{3}{5}$	$\frac{1}{5}$	1	1
x_1	0	1	0	$\frac{3}{5}$	$-\frac{1}{5}$	0	3

(5)

We can colour text and highlight cells in tableau, or just leave them empty:

BV	z	x_1	x_2	x_3	x_4	x_5	RHS
z	1			$-\frac{2}{5}$	$-\frac{1}{5}$		-8
x_2			1	$-\frac{1}{5}$	$\frac{2}{5}$		5
x_5				$-\frac{3}{5}$	$\frac{1}{5}$	1	1
x_1		1		$\frac{3}{5}$	$-\frac{1}{5}$		3

(6)

Here is how you make vectors and matrices:

$$\mathbf{x} = \begin{bmatrix} 1 & 2 & 3 \end{bmatrix} = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}^\top \tag{7}$$

$$\mathbf{A} = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix}^{-1} \tag{8}$$

Here is a formulation of a linear program:

$$\begin{aligned} \min_x \quad & c^\top x \\ \text{s.t.} \quad & Ax \leq b \\ & -1 \leq x_n \leq 1\,, \quad n = 1, \ldots, N \end{aligned}$$

There is an ocean of Latex questions and answers online. If you have a question, most likely someone else will have asked the same question before.