Exercise 1

Function to minimize:

$$x_1 - 2x_2 + 4x_3 \tag{1}$$

Subject to:

$$-x_1 + x_2 \geq 1 \tag{2}$$
$$3x_1 + 2x_3 \leq -1 \tag{3}$$
$$-2x_1 - 5x_3 + 4 \leq 0 \tag{4}$$
$$x_1, x_2 \leq 0 \tag{5}$$
$$x_3 \geq 0 \tag{6}$$

Substitude x_3 with $x_3 = -x_3'$, multiply Eq. 2 with -1 and normalize the equations.

$$x_1 - x_2 \leq 1 \tag{7}$$
$$3x_1 - 2x_3' \leq -1 \tag{8}$$
$$-2x_1 + 5x_3' \leq -4 \tag{9}$$

Therefore we get:

$$c = \begin{pmatrix} 1 \\ -2 \\ -4 \end{pmatrix} \; b = \begin{pmatrix} 1 \\ -1 \\ -4 \end{pmatrix} \; A = \begin{pmatrix} -1 & 1 & 0 \\ 3 & 0 & -2 \\ -2 & 0 & 5 \end{pmatrix}$$