Optimization Assignment-1

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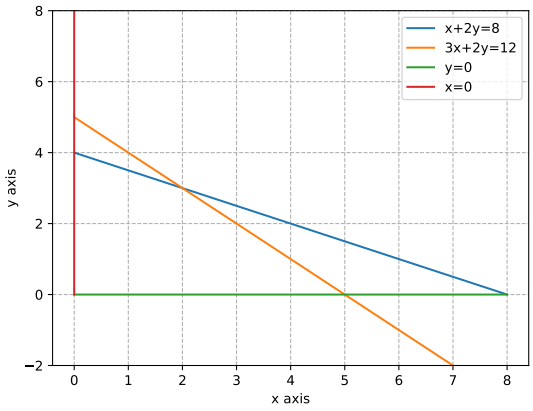
Problem: Minimise

$$Z = -3x + 4y$$

subjected to

$$x + 2y \preceq 8, 3x + 2y \preceq 12, x \succeq 0, y \succeq 0$$



Solution

Problem can be formulated as,

$$\min_{\mathbf{x}} Z = (-3x + 4y) \tag{1}$$

$$x + 2y \preceq 8 \tag{2}$$

$$3x + 2y \preceq 12 \tag{3}$$

$$x \succeq 0, y \succeq 0 \tag{4}$$

eq 2 and 3 to 4 can be expressed in vector form as

$$\min_{\mathbf{x}} \mathbf{Z} = \begin{pmatrix} -3 & 4 \end{pmatrix} \mathbf{x}$$

$$\begin{pmatrix} 1 & 2 \\ 3 & 2 \\ 1 & 0 \\ 0 & 1 \end{pmatrix} \mathbf{x} \succeq \begin{pmatrix} 8 \\ 12 \\ 0 \\ 0 \end{pmatrix}$$

Solving above equations using cvxpy, we get

$$\min_{\mathbf{x}} Z = -12 \tag{5}$$

$$\mathbf{x} = \begin{pmatrix} 4 \\ 0 \end{pmatrix} \tag{6}$$

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