# Optimization Assignment 1

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**Question 1.** Minimize : $(x_1 - 3x_2)$. Subject to:

$$-x_1 + 2x_2 \leq 6 \tag{1}$$

$$x_1 + x_2 \leq 5 \tag{2}$$

$$x_1, x_2 \geq 0 \tag{3}$$

Also, write down the dual problem and get an optimal solution

**Question 2.** Let $S = \{(x_1, x_2, x_3) \mid x_1 - 2x_2 \leq 3;\ 2x_2 + 3x_3 \geq 4\}$

1. Is it a convex set?

2. Does it have a direction vector $d$?

3. Find an extreme point of $S$?

**Question 3.** Let $A = \begin{bmatrix} -1 & 2 & 0 & 1 \\ 1 & 1 & 1 & 0 \end{bmatrix}$.

Let S $= \{(x_1, x_2, x_3) \mid -x_1 + 2x_2 + x_3 = 6;\ x_1 + x_2 + x_4 = 5;\ x_1, x_2, x_3, x_4 \geq 0\}$

Write down all extreme solutions of $S$