Homework problems, set 1

1. Find the minimum

$$\min x^T G x + c^T x \quad \text{subject to} \quad Ax = b \tag{1}$$

where

$$G = \begin{pmatrix} 2 & 0 & 1 \\ 0 & 4 & 2 \\ 1 & 2 & 4 \end{pmatrix}, \quad c = \begin{bmatrix} 1 \\ 0 \\ 5 \end{bmatrix}, \quad A = \begin{pmatrix} 1 & 1 & 1 \end{pmatrix}, \quad b = 10 \tag{2}$$

2. Find the minimum

$$\min x^T G x + c^T x \quad \text{subject to} \quad Ax \geq b \tag{3}$$

where

$$G = \begin{pmatrix} 2 & 0 & 1 \\ 0 & 4 & 2 \\ 1 & 2 & 4 \end{pmatrix}, \quad c = \begin{bmatrix} 1 \\ 0 \\ 5 \end{bmatrix}, \quad A = \begin{pmatrix} 1 & 0 & 1 \\ 0 & 1 & 1 \end{pmatrix} \quad b = \begin{pmatrix} 1 \\ -1 \end{pmatrix} \tag{4}$$

3. Find the values of b for which that the restriction is active.

   Draw the picture.

$$\min x^T G x + c^T x \quad \text{subject to} \quad Ax \geq b \tag{5}$$

where

$$G = \begin{pmatrix} 4 & 2 \\ 2 & 2 \end{pmatrix}, \quad c = \begin{bmatrix} 1 \\ 2 \end{bmatrix}, \quad A = \begin{pmatrix} 1 & -1 \end{pmatrix} \tag{6}$$