Exercise 1

Solve the problem

\[
\begin{align*}
\text{minimize} \quad & -x_1 - 5x_2 \\
\text{subject to} \quad & x_1 + x_2 + x_3 = 5 \\
& x_1 + 3x_2 + x_4 = 7 \\
& x_1, x_2, x_3, x_4 \geq 0
\end{align*}
\]

Use Matlab with the pdip() routine (by Michael C. Ferris) found at the home page. You need to use Matlab’s sparse format. You can do this for the question given by defining

\[
\text{Aden} = \begin{bmatrix} 1 & 1 & 1 & 0; 1 & 3 & 0 & 1 \end{bmatrix}; \\
A = \text{sparse(Aden)};
\]

Your answer should consists of:

- input for the algorithm
- output of the algorithm

Exercise 2

Describe as much of algorithm pdip() as possible. You may use the google search to find additional information about Cholesky factorization, Mehrotra’s method etc.