# Ex 4 Session 0

First focus on the first part of the exercise, i.e. we have to construct a 10×10 Tridiagonal matrix B like this:

$$B=\begin{bmatrix}
5 & 3 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0\\
-1 & 5 & 3 & 0 & 0 & 0 & 0 & 0 & 0 & 0\\
0 & -1 & 5 & 3 & 0 & 0 & 0 & 0 & 0 & 0\\
0 & 0 & -1 & 5 & 3 & 0 & 0 & 0 & 0 & 0\\
0 & 0 & 0 & -1 & 5 & 3 & 0 & 0 & 0 & 0\\
0 & 0 & 0 & 0 & -1 & 5 & 3 & 0 & 0 & 0\\
0 & 0 & 0 & 0 & 0 & -1 & 5 & 3 & 0 & 0\\
0 & 0 & 0 & 0 & 0 & 0 & -1 & 5 & 3 & 0\\
0 & 0 & 0 & 0 & 0 & 0 & 0 & -1 & 5 & 3\\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -1 & 5
\end{bmatrix}$$

We can think to this matrix as the sum of 3 different matrices

$$D=\begin{bmatrix}
5 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0\\
0 & 5 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0\\
0 & 0 & 5 & 0 & 0 & 0 & 0 & 0 & 0 & 0\\
0 & 0 & 0 & 5 & 0 & 0 & 0 & 0 & 0 & 0\\
0 & 0 & 0 & 0 & 5 & 0 & 0 & 0 & 0 & 0\\
0 & 0 & 0 & 0 & 0 & 5 & 0 & 0 & 0 & 0\\
0 & 0 & 0 & 0 & 0 & 0 & 5 & 0 & 0 & 0\\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 5 & 0 & 0\\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 5 & 0\\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 5
\end{bmatrix}$$

-> How to construct this? Let's use diag

(I) I need this vector $\underbrace{[5,5,\dots,5]}_{10\text{ times}}$ -> 5* ones(10,1)

(II) diag of a vector is a matrix with this vector on the main diagonal -> D = diag(5*ones(10,1))

$$CS=\begin{bmatrix}
0 & 3 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0\\
0 & 0 & 3 & 0 & 0 & 0 & 0 & 0 & 0 & 0\\
0 & 0 & 0 & 3 & 0 & 0 & 0 & 0 & 0 & 0\\
0 & 0 & 0 & 0 & 3 & 0 & 0 & 0 & 0 & 0\\
0 & 0 & 0 & 0 & 0 & 3 & 0 & 0 & 0 & 0\\
0 & 0 & 0 & 0 & 0 & 0 & 3 & 0 & 0 & 0\\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 3 & 0 & 0\\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 3 & 0\\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 3\\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0
\end{bmatrix}$$

Like before this time I need of this vector:

$\underbrace{[3,3,\dots,3]}_{9\text{ times}}$ -> 3* ones(9,1)

9 times (think about the reason)

=> CS = diag (3*ones(9,1), 1 )

because I want to put this vector in the first super-diagonal

$$CL=\begin{bmatrix}
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0\\
-1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0\\
0 & -1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0\\
0 & 0 & -1 & 0 & 0 & 0 & 0 & 0 & 0 & 0\\
0 & 0 & 0 & -1 & 0 & 0 & 0 & 0 & 0 & 0\\
0 & 0 & 0 & 0 & -1 & 0 & 0 & 0 & 0 & 0\\
0 & 0 & 0 & 0 & 0 & -1 & 0 & 0 & 0 & 0\\
0 & 0 & 0 & 0 & 0 & 0 & -1 & 0 & 0 & 0\\
0 & 0 & 0 & 0 & 0 & 0 & 0 & -1 & 0 & 0\\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -1 & 0
\end{bmatrix}$$

Again $\underbrace{[-1,-1,\dots,-1]}_{9\text{times}}$ -> -1* ones (9,1)

=> CL = diag (-1*ones(9,1), -1)

first sub-diagonal

=> B = D + CS + CL

At the end the exercise asks to set the elemens of the intersection between column 6,9 and rows 5 and 8 equal to 2

-> use the indices : B([5,8],[6,9]) = 2