Laboratory 1 - 10/10/16

Matrix definition and memory management in MATLAB

Useful commands: diag, length, ones, zeros, sparse, spdiags, spy, whos

Consider the following matrix A of size $n-1 \times n-1$:

$$A = \frac{1}{h^2} \begin{bmatrix} 2 & -1 & 0 & \dots & & & \dots & 0 \\ -1 & 2 & -1 & 0 & \dots & & \dots & 0 \\ 0 & -1 & 2 & -1 & 0 & \dots & \dots & 0 \\ \vdots & & \ddots & \ddots & \ddots & & & \vdots \\ \vdots & & & \ddots & \ddots & \ddots & & \vdots \\ 0 & \dots & & \dots & -1 & 2 & -1 & 0 \\ 0 & \dots & & & \dots & -1 & 2 & -1 \\ 0 & \dots & & & & \dots & -1 & 2 \end{bmatrix} \tag{1}$$

where $h = \dfrac{1}{n}$ and $n = 10$.

Build the matrix in Matlab:

1. using a `for` loop;
2. using the command `diag`;
3. in sparse format.