## Brown/Paris Numerical Analysis: Problem set 3

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## 1 Direct solvers for linear systems

Using the matrix constructed in the previous problem set discretizing the Poisson problem with Dirichlet data, we are going to construct a direct linear solver and compare our results and performance against MATLAB.

- Implement the LU decomposition discussed in class (see p. 138 of text for pseudo-code).
  - Use the LU decomposition to solve the Poisson system and check your answer against MATLAB's backslash operator.
  - Time the performance of your approach: how does CPU-time scale with the size of your matrix to perform the decomposition? What about for the backsolve?
- Repeat using the Thomas algorithm to exploit the sparsity of the matrix.