Assignment 5.

Due Wed., Dec. 2.

Objectives: To experiment with preconditioners.

Implement the Incomplete Cholesky and Modified Incomplete Cholesky preconditioners in your code to solve the diffusion equation (assignment 4). Take the sparsity pattern of the lower triangular factor to be the same as that of the lower triangle of A.

Again try some different grid sizes (say, $h = 1/32$, $h = 1/64$, and $h = 1/128$) and see how the number of iterations is related to the grid size. You might also experiment with some different parameters η in the MIC decomposition. [Note: You can check to see if your IC decomposition is correct by computing the product LDL^T and making sure that it matches A where A has nonzeros. You can check your MIC decomposition by making sure that LDL^T matches A where A has nonzero off-diagonal elements and that the row sums of $LDL^T - (A + E)$ are zero, where $E = \eta h^2 diag(A)$.]