CSCI3656: Numerical Computation
Homework 5: Due Friday, Oct. 9

Turn in your own writeup that includes your code. List any resources you used including collaborating with others. You shouldn't need to use the symbolic toolbox. Submit a PDF on Canvas by Friday, Oct. 9 at 5pm.

I've posted four different matrices as comma-separated text files. For each matrix, first load the matrix into memory. Then perform the following study:

1. Generate a right-hand-side of all ones of appropriate size.
2. Solve $Ax = b$ with `linsolve` or other generic linear solver. Call the resulting vector *truth*. This is the vector against which you will compute the error. Run a timing study with `linsolve`.
3. Write a function that solves $Ax = b$ using either the LU decomposition or the Cholesky factorization, depending on whether the matrix is symmetric or not.
4. Write a function that solves $Ax = b$ using the Jacobi method. Run a timing study with your function.
5. Write a function that solves $Ax = b$ using the Gauss-Seidel method. Run a timing study with your function.

For parts 3-5, report the relative error compared to the *truth* that you computed in part 2.

HOW TO RUN A TIMING STUDY To run a timing study, you should repeat the calculation for several independent trials (say, between 10 and 50) and average the wall clock times over all trials. This helps reduce random variations due to other processing.

BONUS POINTS Here is an opportunity for BONUS POINTS. Repeat the process above for an interesting matrix that you find. Three great places to find interesting matrices are:

- Tim Davis's SuiteSparse Matrix Collection
- NIST Matrix Market
- Matlab's `gallery`

Add a note saying why you think the matrix is interesting. You get 5 points per matrix, up to 25 extra points.