CSCI3656: Numerical Computation
Homework 4: Due Friday, Oct. 2

Turn in your own writeup that includes your code. List any resources you used including collaborating with others. You lose points if you use Matlab's Symbolic Toolbox. Submit a PDF on Canvas by Friday, Oct. 2 at 5pm.

I've posted five different matrices as comma-separated text files. For each matrix, first load the matrix into memory. Then answer the following questions for each matrix:

1. What are the matrix dimensions?
2. How many nonzeros are there?
3. Is it symmetric?
4. Is it diagonal?
5. Is it orthogonal?
6. What is the rank?
7. What is the smallest singular value?
8. What is the largest singular value?
9. What is the condition number?
10. Generate five random right-hand-sides. For each right-hand-side b, try to solve $Ax = b$ with the appropriate solver (like `linsolve`). Did the solver have any issues solving the systems?

For each matrix, generate a report with the answers to each question.

For each matrix, make two plots:

1. Plot the nonzero elements of the matrix.
2. Plot the magnitude of the elements of the matrix.

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.