CLEMSON UNIVERSITY, SCHOOL OF COMPUTING
CPSC 8490 PRINCIPLES OF SCIENTIFIC COMPUTING

# Assignment 1

Return by 2/14/2017

**Problem 1 90%**

- Implement a linear system solver using LU factorization with 3 pivoting strategies in one of the following programming languages: C/C++, Java, Python, or Matlab.
- The pivoting strategies are partial, complete, and Markowitz degree.
- Test your code on square real instances from `http://www.cise.ufl.edu/research/sparse/matrices/`
- The input to your code should be in the Matrix Market format for C/C++, Java, and Python or in MAT for Matlab.
- Document your software
- Everything should be changed using the parameters, i.e., there is no need to recompile your code for new tests, etc.
- Right-hand side (RHS) vector $b$ should be given in a separate input file as a column vector.
- Input parameters should include file names for the input matrix, RHS $b$, and a number of pivoting strategy (1 - partial, 2 - complete, 3 - MD).
- Output should contain 3 files (L, U, and vertical vector x named L.dat, U.dat, and x.dat, respectively), and printed residual, and relative residual.
- Your code will be tested on newton.cs.clemson.edu.
- **Your points will be doubled for an iterative LU solver. If you implement an iterative solver, introduce one more parameter for a number of iterations. Print out residuals for all iterations.**

**Problem 2 10%**

Run SuperLU with the same instances you used in Problem 1. Compare the results using the norms of differences $||L_{SuperLU} - L_{yourcode}||_2$, $||U_{SuperLU} - U_{yourcode}||_2$, and residuals.