*Date: March 5, 1998*
*Due Date: March 12, 1998*

# CS 522: Advanced Methods in Scientific Computing

## Assignment 5

1. Turn **Algorithm FE 4: Band** into a working program, subroutine or procedure. Calculate the bandwidth of the matrix associated with the L-problem using the file delaunay.pts.

2. Write a program, subroutine, or procedure that implements the Cuthill-McKee algorithm for automatically reducing the bandwidth of a matrix.

3. Renumber the points in the file, delaunay.pts so that one would achieve a maximum bandwidth. Now use the Cuthill-McKee program you wrote in the previous problem to optimize the bandwidth. Trying running it a second time and see if it improves.

4. Construct the a, ia, ja vectors for the sparse storage scheme for the same problem. Estimate the costs (in terms of necessary disk space) for storing the global matrix using the sparse storage systems (full and symmetric), the full, non-optimized matrix and the optimized matrix (using Cuthill-McKee).

5. Now create a mesh (uniform or nonuniform) for the L-problem that contains 100 nodes, then 200 nodes, then 500 nodes. Repeat problem (4) for each mesh and try to come up with some expressions for how the the necessary storage demands scale with size for each type of storage system.