Statistics 771 Exam Part II

1. Answer all questions to the best of your ability. Do not consult another person when answering these questions.

2. File templates are provided corresponding to each problem. Do not change the name of the file or change the name of the header function (see the template files). You can add any code that you may need below the header function.

3. Please upload these two files as a single zip file to Canvas.

4. Suppose you have a matrix $A \in \mathbb{R}^{n \times d}$ of full column rank and a matrix $b \in \mathbb{R}^n$. Complete the code in `problemOne.jl` so that the function `solver` returns a solution to $\min_y \|Ay - b\|_2^2$, where the first argument (`arg1`) of `solver` is the matrix A and the second argument (`arg2`) of `solver` is the vector b. Regardless of how you choose to solve this problem, do not use any of Julia's decomposition or solver methods. Please use your own.

5. Suppose you have a matrix $A \in \mathbb{R}^{n \times n}$ of full column rank with nonzeros on the diagonal, and a matrix $b \in \mathbb{R}^n$. Complete the code in `problemTwo.jl` so that

   (a) `solverOne` returns the Jacobi method's approximation to the solution of $Ax = b$ after one hundred iterations, where the initial approximation is the vector of zeros. The first argument (`arg1`) is the matrix A and the second argument (`arg2`) is the vector b.

   (b) `solverTwo` returns the backward Gauss-Seidel method's approximation to the solution of $Ax = b$ after one hundred iterations, where the initial approximation is the vector of zeros. The first argument (`arg1`) is the matrix A and the second argument (`arg2`) is the vector b.

   Do not use any of Julia's decomposition or solver methods. Please use your own.