1. (15 points) Using Matlab, implement Gaussian Elimination with Partial Pivoting based on Algorithm 2.4 on p. 72 in Heath. Make your implementation as efficient as possible. Write a Matlab script which clearly demonstrates that your code works as intended. Turn-in your Matlab code and output.

2. (15 points) Solve Exercise 2.7 on p. 101 in Heath. Use your Matlab code from Question 1 to answer part (b) and the cond command in Matlab to compute an estimated condition number.

3. (15 points) Write an outline of steps which illustrates how to compute the following expression without using any inverses. **For full credit, show how to compute it as efficiently as possible.** Here capital letters are used to denote $n \times n$, invertible matrices. Lower case letters are used to denote vectors of length $n$. In addition, $C = BB^T$. **Justify your algorithm.**

Expression: $ABx + C^{-1}x + uv^T x + B^{-1}x$.

4. (15 points) Analyze the computational complexity of the Cholesky Factorization algorithm. You will want to refer to Algorithm 2.7 on p. 85 in Heath in order to answer this question.