ASSIGNMENT 4

Due March 4, 2004 (before start of class)

Problem 4

1. Use Gaussian elimination without pivoting to solve the linear system

$$\begin{bmatrix} \epsilon & 1 \\ 1 & 1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = \begin{bmatrix} 1+\epsilon \\ 2 \end{bmatrix}$$

   for $\epsilon = 10^{-2k}, k = 1, \ldots, 10$. The exact solution is $x = [1\ 1]^T$, independent of the value of ϵ. How does the accuracy of the computed solution behave as the value of ϵ decreases?

2. Repeat part *a*, still using Gaussian elimination without pivoting, but this time use one iteration of iterative refinement to improve the solution, computing the residual in the same precision as the rest of the computations. Now how does the accuracy of the computed solution behave as the value of ϵ decreases?

3. Repeat part a, but this time use Gaussian elimination with pivoting.

In this problem, you cannot use any MATLAB linear system solver. Instead you should use the functions provided at the course website. You need to download them first to a directory that lies on the MATLAB search path.