

ECE 3340 Numerical Methods

Homework 8: Solving Linear Systems

Name:

ID:

Problem 1: Loss of Precision

Solve the following linear system using (1) Gaussian Elimination and (2) Partial Pivoting with 3 digits of precision. What is the relative error for each?

$$\mathbf{A} = \begin{bmatrix} .0133 & 1.24 \\ 2.34 & 1.77 \end{bmatrix} \mathbf{x} = \begin{bmatrix} 1 \\ 1 \end{bmatrix} \quad \text{where} \quad \mathbf{x} = \begin{bmatrix} -0.184 \\ 0.808 \end{bmatrix}$$

$$E_G =$$

$$E_P =$$

Problem 2: Partial Pivoting

Solve the following linear system using partial pivoting and provide the final indexing vector.

$$\begin{bmatrix} 0 & 4 & 4 & 4 \\ 2 & 3 & 2 & 7 \\ 0 & 2 & 4 & 8 \\ 0 & 1 & 1 & 4 \end{bmatrix} \mathbf{x} = \begin{bmatrix} -4 \\ -20 \\ -10 \\ -6 \end{bmatrix} \quad (1)$$

$$x_1 = \boxed{} \quad x_2 = \boxed{} \quad x_3 = \boxed{} \quad x_4 = \boxed{}$$

$$\ell_1 = \boxed{} \quad \ell_2 = \boxed{} \quad \ell_3 = \boxed{} \quad \ell_4 = \boxed{}$$