Exercise 4.   Student name _____   Student ID _____

1. Solve the linear equation system $\mathbf{Ax} = \mathbf{b}$ with

$$\mathbf{A} = \begin{bmatrix} 1 & 2 & 3 & 4 \\ 2 & 2 & 3 & 4 \\ 3 & 3 & 3 & 4 \\ 4 & 4 & 4 & 4 \end{bmatrix} \qquad \mathbf{b} = \begin{Bmatrix} 1.234 \\ 2.234 \\ 3.334 \\ 4.444 \end{Bmatrix}$$

using Gaussian elimination procedure. Show the matrix and the right-hand side after each elimination step.

2. Solve the ill-conditioned system $\mathbf{Ax} = \mathbf{b}$ with the following coefficient matrix and three right-hand sides

$$\mathbf{A} = \begin{bmatrix} 1.01 & 0.99 \\ 0.99 & 1.01 \end{bmatrix} \qquad \mathbf{b}_1 = \begin{Bmatrix} 2.00 \\ 2.00 \end{Bmatrix} \qquad \mathbf{b}_2 = \begin{Bmatrix} 2.02 \\ 1.98 \end{Bmatrix} \qquad \mathbf{b}_3 = \begin{Bmatrix} 1.98 \\ 2.02 \end{Bmatrix}$$

Compare solutions.