1. Use Gaussian elimination and pivoting technique to solve

$$1.19x_1 + 2.11x_2 - 100x_3 + x_4 = 1.12$$

$$14.2x_1 - 0.112x_2 + 12.2x_3 - x_4 = 3.44$$

$$100x_2 - 99.9x_3 + x_4 = 2.15$$

$$15.3x_1 + 0.110x_2 - 13.1x_3 - x_4 = 4.16$$

```
===== Problem 1: Gaussian Elimination Solution =====
x1 = 0.176776
x2 = 0.012692
x3 = -0.020661
x4 = -1.183264
```


$$A = \begin{bmatrix} 4 & 1 & -1 & 0 \\ 1 & 3 & -1 & 0 \\ -1 & -1 & 6 & 2 \\ 0 & 0 & 2 & 5 \end{bmatrix}$$

```
===== Problem 2: Inverse of Matrix A =====
['0.279693', '-0.080460', '0.038314', '-0.015326']
['-0.080460', '0.379310', '0.057471', '-0.022989']
['0.038314', '0.057471', '0.210728', '-0.084291']
['-0.015326', '-0.022989', '-0.084291', '0.233716']
```

3. Use Crout factorization for a tri-diagonal system to solve the problem

$$\begin{bmatrix} 3 & -1 & 0 & 0 \\ -1 & 3 & -1 & 0 \\ 0 & -1 & 3 & -1 \\ 0 & 0 & -1 & 3 \end{bmatrix} \begin{Bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \end{Bmatrix} = \begin{Bmatrix} 2 \\ 3 \\ 4 \\ 1 \end{Bmatrix}.$$

```
===== Problem 3: Crout Factorization Solution =====
x1 = 1.436364
x2 = 2.309091
x3 = 2.490909
x4 = 1.163636
```