Q2. Row Echelon Form:

Create a 5x5 matrix, A, with entries randomly chosen integers between 0 and 9. To generate the random matrix, set the random seed as the last two digits of your roll number. Reduce matrix A to its Row Echelon Form by performing elementary row operations

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In [1]: import numpy as np
In [5]: import numpy as np
        roll number = 6 # Replace 6 with your actual last two digits
        np.random.seed(6)
In [6]: A = np.random.randint(0, 10, size=(5, 5))
        print("Original matrix A:")
        print(A)
        Original matrix A:
        [[9 3 4 0 9]
         [1 9 1 4 1]
         [8 2 4 2 5]
         [9 6 2 5 5]
         [1 4 5 0 2]]
In [8]: # Function to perform elementary row operations to reduce to row echelon for
        def row_echelon_form(matrix):
            m, n = matrix.shape
            lead = 0
            for r in range(m):
                if lead >= n:
                     break
                i = r
                while matrix[i, lead] == 0:
                     i += 1
                     if i == m:
                         i = r
                         lead += 1
                         if n == lead:
                             break
                matrix[[r, i]] = matrix[[i, r]]
                lv = matrix[r, lead]
                matrix[r] = matrix[r] / lv
                for i in range(m):
                     if i != r:
                         lv = matrix[i, lead]
                         matrix[i] -= lv * matrix[r]
                lead += 1
            return matrix
```

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In [9]: # Reduce matrix A to its row echelon form
A_row_echelon = row_echelon_form(A)
print("\nRow Echelon Form of matrix A:")
print(A_row_echelon)

Row Echelon Form of matrix A:
    [[1 0 0 0 0]
        [0 1 0 0 0]
        [0 0 1 0 0]
        [0 0 0 1 0]
        [0 0 0 0 1]]
In []:
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