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

In [14]:
```
import numpy as np
import sympy as sp
roll_number = 30
np.random.seed(roll_number)
A = np.random.randint(0, 10, size=(5, 5))
print("Random Matrix A:")
sp.Matrix(A)
```

```
Random Matrix A:
```

Out[14]:
$$\begin{bmatrix} 5 & 5 & 4 & 7 & 2 \\ 5 & 1 & 3 & 9 & 7 \\ 7 & 1 & 1 & 3 & 2 \\ 2 & 4 & 4 & 6 & 0 \\ 6 & 0 & 7 & 4 & 2 \end{bmatrix}$$

In [15]:
```
rows, cols = A.shape
lead = 0
row = 0
while lead < cols and row < rows:
    if A[row, lead] == 0:
        non_zero_row = row + 1
        while non_zero_row < rows and A[non_zero_row, lead] == 0:
            non_zero_row += 1
        if non_zero_row == rows:
            lead += 1
            row = 0
            continue
        else:
            A[[row, non_zero_row]] = A[[non_zero_row, row]]

    A[row] = A[row] / A[row, lead]
    for i in range(rows):
        if i != row:
            factor = A[i, lead]
            A[i] = A[i] - factor * A[row]
    lead += 1
    row += 1

print("\nRow Echelon Form of Matrix A:")
sp.Matrix(A)
```

```
Row Echelon Form of Matrix A:
```

Out[15]:
$$\begin{bmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \end{bmatrix}$$

In [ ]:
```
```