Step-1

Consider the following matrices:

$$A_1 = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

$$A_2 = \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$$

$$A_3 = \begin{bmatrix} 1 & 1 \\ 0 & 0 \end{bmatrix}$$

$$A_4 = \begin{bmatrix} 0 & 0 \\ 1 & 1 \end{bmatrix}$$

$$A_5 = \begin{bmatrix} 1 & 0 \\ 1 & 0 \end{bmatrix}$$

$$A_6 = \begin{bmatrix} 0 & 1 \\ 0 & 1 \end{bmatrix}$$

Step-2

Determine the matrices which are similar.

Step-3

Recall that similar matrices have same Eigen values. Calculate the Eigen values of all the matrices. Matrix A_1 is triangular matrix so Eigen values of matrix A_1 will be $\lambda_1 = (1,1)$. Similarly Eigen values of matrices A_3 and A_6 are :

$$\lambda_3 = (1,0)$$

$$\lambda_6 = (0,1)$$

Therefore, $\boxed{A_3, A_6}$ are similar matrices.

Step-4

Calculate Eigen values of matrix A_2;

$$A_2 - \lambda I = \begin{bmatrix} 0-\lambda & 1 \\ 1 & 0-\lambda \end{bmatrix}$$

$$\det\left(A_2 - \lambda I\right) = 0$$

$$(-\lambda)(-\lambda) - 1 = 0$$

$$\lambda^2 - 1 = 0$$

On solving above equation following Eigen values are obtained:

$$\lambda_2 = (1, -1)$$

Step-5

Eigen values of matrix A_4 will be:

$$A_4 - \lambda I = \begin{bmatrix} 0-\lambda & 0 \\ 1 & 1-\lambda \end{bmatrix}$$

$$\det\left(A_4 - \lambda I\right) = 0$$

$$(-\lambda)(1-\lambda) = 0$$

$$\lambda^2 - \lambda = 0$$

On solving above equation following Eigen values are obtained:

$$\lambda_4 = (1, 0)$$

Step-6

Similarly, Eigen values of matrix A_5 will be $\lambda_5 = (1, 0)$.

Step-7

Therefore, following matrices are similar:

$$\boxed{\begin{bmatrix} 0 & 0 \\ 1 & 1 \end{bmatrix}, \begin{bmatrix} 1 & 1 \\ 0 & 0 \end{bmatrix}, \begin{bmatrix} 1 & 0 \\ 1 & 0 \end{bmatrix}, \begin{bmatrix} 0 & 1 \\ 0 & 1 \end{bmatrix}}$$

Matrix A_1 and A_2 are similar to themselves.