

- (1) (5 point) Compute the Jordan form of the following matrix.

$$A = \begin{pmatrix} 2 & 0 & 3 \\ 0 & 3 & 1 \\ 0 & 0 & 2 \end{pmatrix}$$

- (2) (5 points) Compute the Jordan form of the following matrix.

$$A = \begin{pmatrix} 1 & 0 & 0 \\ 1 & 1 & 1 \\ 1 & 0 & 1 \end{pmatrix}$$

- (3) (5 points) Compute the Jordan form of the following matrix.

$$A = \begin{pmatrix} 1 & 1 & 1 & 1 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 1 \end{pmatrix}$$

- (4) (5 points) Find all possible Jordan forms of a matrix with characteristic polynomial $p(\lambda) = (\lambda - 1)^2(\lambda + 3)^3$ and three eigenvectors.

- (5) (5 points) Find a matrix similar to

$$J = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 0 & 1 \\ 0 & 0 & 0 \end{pmatrix}$$

that is not J .

- (6) (5 points) The matrix

$$\begin{pmatrix} 2 & 2 & 0 & -1 \\ 0 & 0 & 0 & 1 \\ 1 & 5 & 2 & -1 \\ 0 & -4 & 0 & 4 \end{pmatrix}$$

has Jordan basis,

$$\begin{pmatrix} 3 \\ -1 \\ 3 \\ -2 \end{pmatrix}, \begin{pmatrix} 0 \\ 0 \\ 2 \\ 0 \end{pmatrix}, \begin{pmatrix} -1 \\ 1 \\ -1 \\ 2 \end{pmatrix}, \begin{pmatrix} 0 \\ 0 \\ 0 \\ 1 \end{pmatrix}$$

How many eigenvectors does A have?