Quiz8

1. P329 (6)

$$\begin{bmatrix} 1 & 2 \\ 0 & 3 \end{bmatrix}$$

求eigenvalue , eigenvectors

$$\begin{vmatrix} 1-\lambda & 2 \\ 0 & 3-\lambda \end{vmatrix} = 0$$

$(1-\lambda)(3-\lambda) = 0, \quad \lambda = 1, 3$

$\lambda = 1 \quad 0x_1 + 2x_2 = 0$

$\qquad 0x_1 + 2x_2 = 0$

$\qquad x_2 = 0, \quad \begin{bmatrix} 1 \\ 0 \end{bmatrix}$

$\lambda = 3 \quad -2x_1 + 2x_2 = 0$

$\qquad 0x_1 + 0x_2 = 0$

$$\begin{bmatrix} 1 \\ 1 \end{bmatrix}$$

2.(12)

$$\begin{bmatrix} 3 & 5 & 3 \\ 0 & 4 & 6 \\ 0 & 0 & 1 \end{bmatrix}$$

求eigenvalue , eigenvectors

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

$(3-\lambda)(4-\lambda)(1-\lambda) = 0, \quad \lambda = 3,4,1 \text{ eigenvalue}$

$\lambda = 3 \quad 0x_1 + 5x_2 + 3x_3 = 0$

$\quad\quad\quad 0x_1 + 1x_2 + 6x_3 = 0$

$\quad\quad\quad 0 + 0 + (-2)x_3 = 0$

$\quad\quad\quad x_3 = 0, x_2 = 0, x_1 = 任意數 \text{ , eigenvector} = \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix}$

$\lambda = 4 \quad -x_1 + 5x_2 + 3x_3 = 0$

$\quad\quad\quad 0x_2 + 6x_3 = 0$

$\quad\quad\quad (-3)x_3 = 0$

$\quad\quad\quad x_3 = 0, x_2 = 1, x_1 = 5 \text{ , eigenvector} = \begin{bmatrix} 5 \\ 1 \\ 0 \end{bmatrix}$

$$\lambda = 1 \quad 2x_1 + 5x_2 + 3x_3 = 0$$
$$0x_1 + 3x_2 + 6x_3 = 0$$
$$0 = 0$$

$$x_3 = 1, x_2 = -2, x_1 = \frac{7}{2} \ , \text{eigenvector} = \begin{bmatrix} 7 \\ -4 \\ 2 \end{bmatrix}$$