

①. \rightarrow Basis $\Rightarrow \{ \underset{v_1}{(1, 2, 2)}, \underset{v_2}{(2, 1, 2)}, \underset{v_3}{(2, 2, 1)} \}$.
for \mathbb{R}^3 .

Now \rightarrow Let $\boxed{u_1 = \frac{v_1}{\|v_1\|} \Rightarrow \frac{1}{3} \cdot (1, 2, 2)}$

$\& w_2 = v_2 - \frac{\langle v_2, u_1 \rangle \cdot u_1}{\langle u_1, u_1 \rangle} \Rightarrow v_2 - \langle v_2, u_1 \rangle \cdot u_1$

$\Rightarrow (2, 1, 2) - \langle (2, 1, 2), (\frac{1}{3}, \frac{2}{3}, \frac{2}{3}) \rangle \cdot (\frac{1}{3}, \frac{2}{3}, \frac{2}{3})$

$\Rightarrow (2, 1, 2) - \left\{ \frac{2}{3} + \frac{2}{3} + \frac{4}{3} \right\} \cdot (\frac{1}{3}, \frac{2}{3}, \frac{2}{3})$

$\Rightarrow (2, 1, 2) - \left(\frac{8}{9}, \frac{16}{9}, \frac{16}{9} \right)$

$w_2 \Rightarrow \left(\frac{10}{9}, -\frac{7}{9}, \frac{2}{9} \right)$

thus $\rightarrow u_2 = \frac{w_2}{\|w_2\|} \Rightarrow \frac{\left(\frac{10}{9}, -\frac{7}{9}, \frac{2}{9} \right)}{\sqrt{\frac{100+49+4}{81}}}$

$\boxed{u_2 \Rightarrow \frac{1}{\sqrt{153}} \cdot (10, -7, 2)}$

27

240-126 | Week 35

AUGUST

202

Thursday

$$u_3 = \frac{w_3}{\|w_3\|}$$

9

$$10 \quad \underline{So} \rightarrow w_3 = v_3 - \langle v_3, u_1 \rangle \cdot u_1 - \langle v_3, u_2 \rangle \cdot u_2$$

$$11 \Rightarrow (2, 2, 1) - \langle (2, 2, 1), \left(\frac{1}{3}, \frac{2}{3}, \frac{2}{3}\right) \rangle \left(\frac{1}{3}, \frac{2}{3}, \frac{2}{3}\right)$$

12

$$- \langle (2, 2, 1), \frac{1}{\sqrt{153}} (10, -7, 2) \rangle \cdot \frac{1}{\sqrt{153}} (10, -7, 2)$$

1

$$2 \Rightarrow (2, 2, 1) - \left\{ \frac{2}{3} + \frac{4}{3} + \frac{2}{3} \right\} \cdot \frac{1}{3} (1, 2, 2)$$

3

$$- \frac{1}{\sqrt{153}} (20 - 14 + 2) \cdot \frac{1}{\sqrt{153}} (10, -7, 2)$$

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$$\Rightarrow (2, 2, 1) - \frac{8}{9} (1, 2, 2) - \frac{8}{153} (10, -7, 2)$$

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$$6 \Rightarrow \frac{1}{153} (306, 306, 153) - \frac{1}{153} (136, 272, 272)$$

7

$$- \frac{1}{153} (80, -56, 16)$$

$$\Rightarrow \frac{1}{153} (90, 90, -135) \Rightarrow \frac{1}{17} (10, 10, -15)$$

$$\Rightarrow \frac{5}{17} (2, 2, -3)$$

$$u_3 = \frac{5}{17} \cdot \frac{(2, 2, -3)}{\sqrt{17}}$$

⑤ → To find char. eq. →

$$|A - \lambda I| = 0$$

$$\begin{vmatrix} 2-\lambda & -4 & 3 \\ 2 & -3-\lambda & 5 \\ 1 & -1 & 4-\lambda \end{vmatrix} = 0$$

$$(2-\lambda) \cdot \{ +(\lambda+3)(\lambda-4)+5 \} + 4 \cdot \{ 8-2\lambda-5 \} + 3 \cdot \{ -2 + (\lambda+3) \} = 0$$

$$(2-\lambda) \cdot \{ \lambda^2 - \lambda - 12 + 5 \} - 8\lambda + 12 + 3\lambda + 3 = 0$$

$$2\lambda^2 - 2\lambda - 14 - \lambda^3 + \lambda^2 + 7\lambda - 5\lambda + 15 = 0$$

$$-\lambda^3 + 3\lambda^2 + 1 = 0 \rightarrow \textcircled{1}$$

By using Cayley-Hamilton →

$$-A^3 + 3A^2 + I = 0$$

$$I = (A^3 - 3A^2)$$

Multiplying (A^{-1}) both sides →

$$\boxed{A^{-1} = A^2 - 3A}$$

29

242-124 | Week 35

AUGUST
20

Saturday

$$A^2 = \begin{bmatrix} 2 & -4 & 3 \\ 2 & -3 & 5 \\ 1 & -1 & 4 \end{bmatrix} \cdot \begin{bmatrix} 2 & -4 & 3 \\ 2 & -3 & 5 \\ 1 & -1 & 4 \end{bmatrix}$$

$$A^2 \Rightarrow \begin{bmatrix} -1 & 1 & -2 \\ 3 & -4 & 11 \\ 4 & -5 & 14 \end{bmatrix}$$

12

So \rightarrow

$$A^{-1} = A^2 - 3A$$

2

$$\Rightarrow \begin{bmatrix} -1 & 1 & -2 \\ 3 & -4 & 11 \\ 4 & -5 & 14 \end{bmatrix} - \begin{bmatrix} 6 & -12 & 9 \\ 6 & -9 & 15 \\ 3 & -3 & 12 \end{bmatrix}$$

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$$A^{-1} \Rightarrow \begin{bmatrix} -7 & 13 & -11 \\ -3 & 5 & -4 \\ 1 & -2 & 2 \end{bmatrix}$$

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$$0 = I + 2A + 3A^2 - A^{-1}$$

$$(2A + 3A^2 - A^{-1}) = -I$$

30 Sunday

$$A \cdot 2 + 3A^2 = -A^{-1}$$

$$4-6+5$$

$$-6+12-3$$

$$6-20+12$$

$$4-6+5$$

$$-6+9-5$$

$$\textcircled{4}$$

$$6-15+20$$

$$\Rightarrow \textcircled{11}$$

$$2-2+4$$

$$-4+3-4$$

$$-3$$

$$3-5+16$$

$$\textcircled{14}$$

$\textcircled{2} \rightarrow V$ is v.s. in $\mathbb{R}^{3 \times 3}$.

Basis of $V \Rightarrow B$

$$\text{So} \rightarrow B = \left\{ \begin{bmatrix} 1 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}, \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}, \begin{bmatrix} 0 & 0 & 1 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}, \right.$$

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

$$\left. \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 1 & 0 & 0 \end{bmatrix}, \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 1 & 0 \end{bmatrix}, \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 1 \end{bmatrix} \right\}.$$

$\text{Dim.}(B) = 9$

Generate observation $\rightarrow A^n$ will give 'A' every single time. \rightarrow

$$A^n = A$$

which will not be equal to any diff. 'c'.

01

245-121 | Week 36

SEPTEMBER

202

Tuesday

let P, Q are 2 matrix of $(n \times n)$.such that $\rightarrow P, Q \in B \Rightarrow$ such that

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