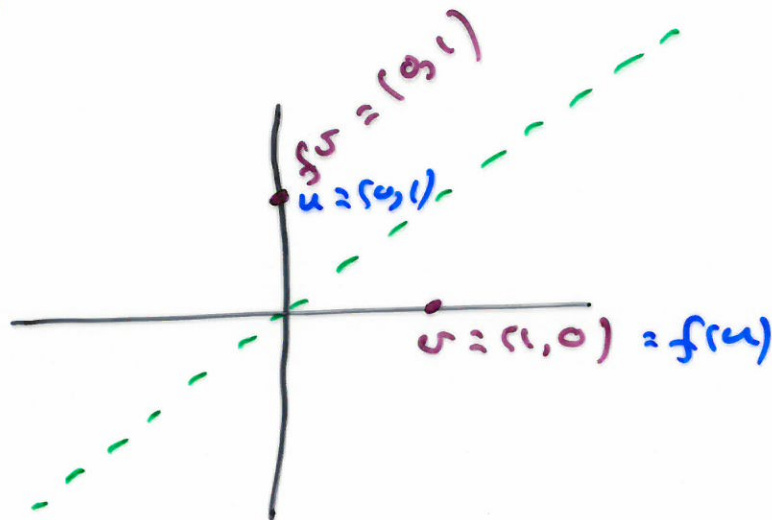


Q 3 a i)



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

\uparrow

$$\underbrace{\begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}}_{R \text{ represents } f} \begin{pmatrix} 0 \\ 1 \end{pmatrix} = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$

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

$\underbrace{\hspace{1cm}}_{G \text{ represents } g}$

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

Q3 a ii)

got n represented by

$$GF = \begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix} \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix} = \begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix}$$

Q3 b i)

$$x_n = 4x_{n-1} + 5x_{n-2}$$

$$x_{n-1} = x_{n-1}$$

$$\begin{pmatrix} x_n \\ x_{n-1} \end{pmatrix} = \underbrace{\begin{pmatrix} 4 & 5 \\ 1 & 0 \end{pmatrix}}_A \begin{pmatrix} x_{n-1} \\ x_{n-2} \end{pmatrix}$$

3b ii)

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

So $v_1 = \begin{pmatrix} 1 \\ -1 \end{pmatrix}$ is an eigenvector
corresponding to eigenvalue $\lambda_1 = -1$

$$\begin{pmatrix} 4 & 5 \\ 1 & 0 \end{pmatrix} \begin{pmatrix} 5 \\ 1 \end{pmatrix} = \begin{pmatrix} 25 \\ 5 \end{pmatrix}$$

so $v_2 = \begin{pmatrix} 5 \\ 1 \end{pmatrix}$ is an eigenvector

corresponding to $\lambda_2 = 5$.

$$D = \begin{pmatrix} -1 & 0 \\ 0 & 5 \end{pmatrix}$$

$$T = \begin{pmatrix} 1 & 5 \\ -1 & 1 \end{pmatrix}$$

The "Handbook of ancient religions"

has ISBN

0 5 2 1 8 4 7 1 2 ?

What is ??

$$1 \cdot 0 + 2 \cdot 5 + 3 \cdot 2 + 4 \cdot 1 + 5 \cdot 8 + 6 \cdot 4$$

$$+ 7 \cdot 7 + 8 \cdot 1 + 9 \cdot 2 + 10 \cdot ? \equiv 0$$

mod 11

$$\overbrace{-1 + 6}^5 + \overbrace{+4 - 4}^{=0} + \overbrace{+2 + 5 - 3 - 4}^0 + 10 \cdot ? \equiv 0$$

$$+ 5 + 10 \cdot ? \equiv 0$$

$$10 \cdot ? \equiv -5 \equiv 6$$

$$10 \cdot 5 \equiv 6 \quad \text{so} \quad ? = 5$$