

Christopher Chennu

Monday 8 am

3031953328

11.1

$$\left[\begin{array}{cccc|c} 1 & 1 & 1 & 1 & 12 \\ 1 & -1 & 1 & -1 & 2 \\ 1 & 1 & -1 & -1 & 0 \\ 1 & -1 & -1 & 1 & 2 \end{array} \right] \sim \left[\begin{array}{cccc|c} 1 & 0 & 0 & 0 & 4 \\ 0 & 1 & 0 & 0 & 2 \\ 0 & 0 & 1 & 0 & 3 \\ 0 & 0 & 0 & 1 & 3 \end{array} \right]$$

4 vegetable Samosa

2 Bhangar Bharta

3 Chicken Tikka Masala

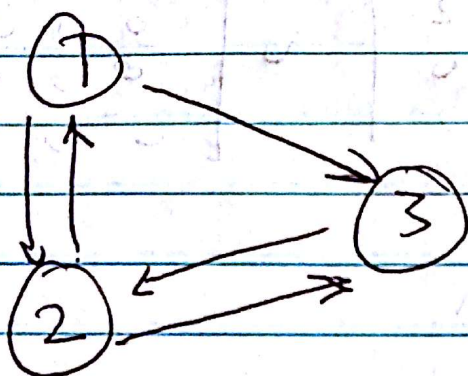
3 Lamb Chops Tandoori

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1, 2

a)



b) Not possible. Q must be inverse of A , but A ~~has no~~ is not invertible as its columns are linearly dependent.

c)

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1.3

a) since $s = \begin{bmatrix} a \\ b \\ c \end{bmatrix}$

$$\begin{bmatrix} 0 & 0 & 1 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \end{bmatrix} \begin{bmatrix} a \\ b \\ c \end{bmatrix} = \begin{bmatrix} c \\ a \\ b \end{bmatrix}$$

and

$$[a \ b \ c] \begin{bmatrix} 0 & 0 & 1 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \end{bmatrix} = [b \ c \ a]$$

it basically just shifts the elements of the vector the circular matrix is multiplied by

b) i. $C = \begin{bmatrix} 0 & 0 & 1 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \end{bmatrix}^2 = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ 1 & 0 & 0 \end{bmatrix}$

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

$$C^4 = C C^3 = \begin{bmatrix} 0 & 0 & 1 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \end{bmatrix}$$

ii) 999 is power of 3; $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

$$C^{1000} = C \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} = \begin{bmatrix} 0 & 0 & 1 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \end{bmatrix}$$

$$C^{1001} = C^2 = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ 1 & 0 & 0 \end{bmatrix}$$