$$\begin{cases} x_1 + t x_2 + t^2 x_3 = t^4 \\ t^2 x_1 + x_2 + t x_3 = t^3 \\ t x_1 + t^2 x_2 + x_3 = 0 \end{cases}$$

$$\begin{bmatrix} 1 & t & t^2 \\ t^2 & 1 & t \\ t & t^2 & 1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = \begin{bmatrix} t^4 \\ t^3 \\ 0 \end{bmatrix}$$

② $-$ ③ $\times t$

$$(1 - t^3) x_2 = t^3$$
$$x_2 = \frac{t^3}{1 - t^3} \qquad (1 - t^3) \neq 0 \qquad \lim_{t \to \infty} x_2(t) = \lim_{t \to \infty} \frac{t^3}{1 - t^3} = -1$$

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix}$$

$$RREF(A) = \begin{bmatrix} 1 & 2 & 3 \\ 0 & 1 & 2 \end{bmatrix}$$

$$\begin{cases} x_1 + 2x_2 + 3x_3 = 0 \\ x_2 + 2x_3 = 0 \end{cases}$$

Set $x_1 = t$

$$\begin{cases} 2x_2 + 3x_3 = -t \\ x_2 + 2x_3 = 0 \end{cases}$$

$$\Rightarrow x_3 = t \quad x_2 = -2t$$

So $x = \begin{bmatrix} t & -2t & t \end{bmatrix}^T = t \begin{bmatrix} 1 & -2 & 1 \end{bmatrix}^T$

$$Null(A) = \left\{ t \begin{bmatrix} 1 \\ -2 \\ 1 \end{bmatrix} \mid t \in R \right\}$$

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