

$$\det = x^4 + 13x^3 - 219x^2 - 835x + 3500$$

Working with $x = -5.6$

$$\text{let } \lambda = x$$

$$\det(A - \lambda I) = 0$$

$$A - (-5.6)I = A + 5.604I$$

$$\text{Sub back: } \begin{bmatrix} 4+5.6 & 8 & -1 & -2 \\ -2 & -9.5.6 & -2 & -4 \\ 0 & +10 & 5+5.6 & -10 \\ -1 & -13 & -14 & -13+5.6 \end{bmatrix} = \begin{bmatrix} 9.6 & 8 & -1 & -2 \\ -2 & -3.4 & -2 & -4 \\ 0 & +10 & 10.6 & -10 \\ -1 & -13 & -14 & -7.4 \end{bmatrix}$$

$$\vec{v} = \begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \end{bmatrix}$$

$$\text{equations: (1) } 9.6x_1 + 8x_2 - x_3 - 2x_4 = 0$$

$$(2) -2x_1 - 3.4x_2 - 2x_3 - 4x_4 = 0$$

$$(3) 0x_1 + 10x_2 + 10.6x_3 - 10x_4 = 0$$

$$(4) -x_1 - 13x_2 - 14x_3 - 7.4x_4 = 0$$

Since equation (3) is simple, let's use it to simplify the other equations

$$(1) \text{ use (3) to express } x_2: 10x_2 + 10.6x_3 - 10x_4 = 0$$

$$\therefore x_2 = \frac{-10.6x_3 + 10x_4}{10}$$

$$x_2 = -1.06x_3 + x_4$$

$$(2) \text{ Sub } x_2 \text{ into (1) equation: } 9.6x_1 + 8x_2 - x_3 - 2x_4 = 0$$

$$\Rightarrow 9.6x_1 + 8(-1.06x_3 + x_4) - x_3 - 2x_4 = 0$$

$$\Rightarrow 9.6x_1 - 8.48x_3 + 8x_4 - x_3 - 2x_4 = 0$$

$$\Rightarrow 9.6x_1 - 9.48x_3 + 6x_4 = 0$$

$$\therefore x_1 = \frac{9.48x_3 - 6x_4}{9.6}$$

$$\text{Let's set } x_3 = t$$

$$x_4 = s$$

$$\therefore x_2 = -1.06t + s$$

$$x_1 = \frac{9.48t - 6s}{9.6}$$