$$\frac{6x^2+5x+4}{(x-1)(x-2)(x-3)} = \frac{C_1}{x-1} + \frac{C_2}{x-2} + \frac{C_3}{x-3}$$

$$6x+5x+4 = C_1(x-2)(x-3) + C_2(x-1)(x-3) + C_3(x-1)(x-2)$$

distribute

$$6x+5x+4 = C_1x^2 - 5C_1x + 6C_1 + C_2x^2 - 4C_2x + 3C_2 + C_3x^2 - 3C_3x + 2C_3$$

pull out like terms

$$x^2(C_1+C_2+C_3) \qquad 6x^2$$

$$x(-5C_1-4C_2-3C_3) = 5x$$

$$1(6C_1+3C_2+2C_3) \qquad 4$$

convert to matrix

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