ECE 202
M8
Hand Calculations.

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

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

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

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

$$\Rightarrow 6 + 5x + 4x^2 = x^2(C_1 + C_2 + C_3) + x(-5C_1 - 4C_2 - 3C_3) + (6C_1 + 3C_2 + 2C_3)$$

$$\Rightarrow \begin{aligned} C_1 + C_2 + C_3 &= 4 \\ -5C_1 - 4C_2 - 3C_3 &= 5 \\ 6C_1 + 3C_2 + 2C_3 &= 6 \end{aligned} \Rightarrow \begin{bmatrix} 1 & 1 & 1 \\ -5 & -4 & -3 \\ 6 & 3 & 2 \end{bmatrix} \begin{bmatrix} C_1 \\ C_2 \\ C_3 \end{bmatrix} = \begin{bmatrix} 4 \\ 5 \\ 6 \end{bmatrix}$$