HW4_1

$$A = \begin{bmatrix} -6 \\ 9 \\ 9 \end{bmatrix} \quad B = \begin{bmatrix} 0 & 8 \\ 6 & 6 \\ -6 & 9 \\ 1 & 3 \end{bmatrix} \quad C = \begin{bmatrix} -8 & 7 & 9 \end{bmatrix}$$

$$D = \begin{bmatrix} 4 & 3 & -4 & 4 \\ 5 & -6 & -8 & -3 \\ 5 & 4 & -7 & 9 \\ -2 & -8 & 7 & -8 \end{bmatrix}$$

① $e = C * A - 10$

$e(1,1) = C_{11} * A_{11} + C_{12} * A_{21} + C_{13} * A_{31} - 10$

$e(1,1) = -8 * -6 + 7 * 9 + 9 * 9 - 10$

$e(1,1) = 192 - 10 = 10$

② $f = D^2$

$f(4,2) = D_{41} * D_{12} + D_{42} * D_{22} + D_{43} * D_{32} + D_{44} * D_{42}$

$= -2 * 3 + (-8 * -6) + (7 * 4) + (-2 * -8)$

$= 86$

③ $g = D .* B$

$$g(4,2) = \begin{bmatrix} -2 & -8 & 7 & -8 \end{bmatrix} .* \begin{bmatrix} 3 \\ -6 \\ 4 \\ 8 \end{bmatrix}$$

$$= \begin{bmatrix} -2\times3 & -8\times3 & 7\times3 & -8\times3 \\ -2\times-6 & -8\times-6 & 7\times-6 & -8\times-6 \\ -2\times4 & -8\times4 & 7\times4 & -8\times4 \\ -2\times8 & -8\times8 & 7\times8 & -8\times8 \end{bmatrix}$$

$$= \begin{bmatrix} -6 & -24 & 21 & -24 \\ 12 & 48 & -42 & 48 \\ -8 & -32 & 28 & -32 \\ 16 & 64 & -56 & 64 \end{bmatrix}$$

④ $h = D(2:3,:) * B$

$$h = \begin{bmatrix} 15 & -77 \\ 57 & 28 \end{bmatrix}$$

HW4_2

$$\begin{bmatrix} 3 & 1 & 5 & 5 \\ 4 & -4 & 5 & 0 \\ -4 & -2 & -4 & 3 \\ 5 & 1 & -5 & -4 \end{bmatrix} \begin{Bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \end{Bmatrix} = \begin{Bmatrix} 42 \\ -9 \\ -3 \\ -5 \end{Bmatrix}$$

$R_2 - (\frac{4}{3}) R_1 \to R_2$ $\quad R_4 - \frac{5}{3} R_1 \to R_4$

$R_3 - (\frac{-4}{3}) R_1 \to R_3$

$$\begin{bmatrix} 3x_1 & x_2 & 5x_3 & 5x_4 & 42 \\ 0x_1 & -16/3 x_2 & & & \end{bmatrix}$$

$$\begin{bmatrix} 3x_1 & x_2 & 5x_3 & 5x_4 & 42 \\ 4-(4/3)\cdot 3 & -4-4/3 \cdot 1 & & & \end{bmatrix}$$

$$R_2 \to \begin{bmatrix} 4-\frac{4}{3}\cdot 3 & -4-\frac{4}{3}\cdot 1 & 5-\frac{4}{3}\cdot 5 & 0-\frac{4}{3}\times 5 \end{bmatrix}$$

$$R_3 \to \begin{bmatrix} -4-(\frac{-4}{3})\cdot 3 & -2+\frac{4}{3}\cdot 4 & -4+\frac{4}{3}\times 5 & 3+\frac{4}{3}\times 5 \end{bmatrix}$$

$$R_4 \to \begin{bmatrix} 5-\frac{5}{3}\times 3 & 1-\frac{5}{3}\times 1 & -5-\frac{5}{3}\times 5 & -4-\frac{5}{3}\times 5 \end{bmatrix}$$

$$\left[\begin{array}{cccc|c} 3x_1 & x_2 & 5x_3 & 5x_4 & 42 \\ 0 & -16/3 x_2 & -5/3 x_3 & \frac{-20}{3}x_4 & -65 \\ 0 & -2/3 x_2 & 8/3 x_3 & 2x_4 & 53 \\ 0 & -2/3 \cdot x_2 & -10/3 x_3 & \frac{-57}{3}x_4 & -75 \end{array}\right]$$

$$R_3 \rightarrow R_3 - \left(\frac{-2/3}{-16/3}\right)R_2 \quad , \quad R_4 \rightarrow R_4 - \left(\frac{-2/3}{-16/3}\right)R_2$$

$$\left[\begin{array}{cccc|c} 3x_1 & 1x_2 & 5x_3 & 5x_4 & 42 \\ 0x_1 & -16/3 x_2 & -5/3 x_3 & -20/3 x_4 & -65 \\ 0x_1 & 0x_2 & 23/8 x_3 & 21/2 x_4 & 489/8 \\ 0x_1 & 0x_2 & -105/8 x_3 & -23/2 x_4 & -535/8 \end{array}\right]$$

$$R_4 = R_4 - \left(\frac{-105/8}{23/8}\right)R_3$$

$$\left[\begin{array}{cccc|c} 3x_1 & 1x_2 & 5x_3 & 5x_4 & 42 \\ 0x_1 & -16/3 x_2 & -5/3 x_3 & -20/3 x_4 & -65 \\ 0x_2 & 0x_2 & 23/8 x_3 & 21/2 x_4 & 489/8 \\ 0x_1 & 0x_2 & 0x_3 & \frac{838}{23}x_4 & 4880/23 \end{array}\right]$$

$$x_4 = \frac{838}{23} \times \frac{4880}{23} \times \frac{23}{838} =$$

$$\frac{4880}{23} = \frac{2240}{419}$$

$$\frac{838/23}{}$$

$$\frac{23}{8}x_3 + \frac{21}{2}\left(\frac{2440}{419}\right) = \frac{489}{8}$$

$$x_3 = -3/419$$

$$-\frac{16}{3}x_2 - \frac{5}{3}\left(\frac{-3}{419}\right) - \frac{20}{3}\left(\frac{2240}{419}\right) = -65$$

$$x_2 = \frac{4115}{838}$$

$$3x_1 + \left(\frac{4115}{838}\right) + 5\left(\frac{-3}{419}\right) + 5\left(\frac{2240}{419}\right) = 42$$

$$x_1 = \frac{2237}{838}$$