UNIVERSIDAD MARIANO GALVEZ DE GUATEMALA
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FACULTAD DE INGENIERIA

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Asignatura:	Algebra Lineal	**Código:**	0907-007	**Semestre:**	Segundo
Ciclo:	Segundo			**Tarea 8**	
Catedrático:	Ing. M.A. Samuel de Jesús García				

Sistemas de Ecuaciones por Matrices Inversas

Resuelva por el método de Matriz Inversa los siguientes Sistemas de Ecuaciones:

1.

3x + 2y - z = 4

X – 2y + 2z = 3

2x + y -2z = -2

1) $3x + 2y - z = 4$
$x - 2y + 2z = 3$
$2x + y - 2z = -2$

$A = \begin{pmatrix} 3 & 2 & -1 \\ 1 & -2 & 2 \\ 2 & 1 & -2 \end{pmatrix}$ $b = \begin{pmatrix} 4 \\ 3 \\ -2 \end{pmatrix}$ $X = \begin{pmatrix} x \\ y \\ z \end{pmatrix}$

$12 + 8 + (-1) - 4 - 6(-4) = 13$ $|A| = 13$

$A = \begin{pmatrix} 3 & 2 & -1 \\ 1 & -2 & 2 \\ 2 & 1 & -2 \end{pmatrix} =$

F1	F2	F3
$4 - 2 = 2$	$-4 - (-1) = -3$	$4 - 2 = 2$
$-2 - 4 = -6$	$-6 - (-2) = -4$	$6 - (-1) = 7$
$1 - (-4) = 5$	$3 - 4 = -1$	$-6 - 2 = -8$

$A^* = \begin{pmatrix} 2 & -6 & 5 \\ -3 & -4 & -1 \\ 2 & 7 & -8 \end{pmatrix}$ $A = \begin{pmatrix} 2 & 6 & 5 \\ 3 & -4 & 1 \\ 2 & -7 & -8 \end{pmatrix}$ $(A^*)^t = \begin{pmatrix} 2 & 3 & 2 \\ 6 & -4 & -7 \\ 5 & 1 & -8 \end{pmatrix}$

$$A^{-1} = 1/13 \begin{pmatrix} 2 & 3 & 2 \\ 6 & -4 & -7 \\ 5 & 1 & -8 \end{pmatrix} = \begin{pmatrix} 2/13 & 3/13 & 2/13 \\ 6/13 & -4/13 & -7/13 \\ 5/13 & 1/13 & -8/13 \end{pmatrix}$$

$$X = \begin{pmatrix} x \\ y \\ z \end{pmatrix} = \begin{pmatrix} 2/13 & 3/13 & 2/13 \\ 6/13 & -4/13 & -7/13 \\ 5/13 & 1/13 & -8/13 \end{pmatrix} \begin{pmatrix} 4 \\ 3 \\ -2 \end{pmatrix} = \quad R// \begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix}$$

$x = 2/13 \times 4 + 3/13 \times 3 + 2/13 \times (-2) = 1$

$y = 6/13 \times 4 + -4/13 \times 3 + -7/13 \times (-2) = 2$

$z = 5/13 \times 4 + 1/13 \times 3 + -8/13 \times (-2) = 3$

2.

$x_1 + x_2 + x_3 = 6$

$-2x_1 + x_2 - x_3 = -5$

$-x_1 + 2x_2 - 2x_3 = -1$

2) $x_1 + x_2 + x_3 = 6$
$-2x_1 + x_2 - x_3 = -5$
$-x + 2x_2 - 2x_3 = -1$

$$A = \begin{pmatrix} 1 & 1 & 1 \\ -2 & 1 & -1 \\ -1 & 2 & -2 \end{pmatrix} \quad b = \begin{pmatrix} 6 \\ -5 \\ -1 \end{pmatrix} \quad X = \begin{pmatrix} x_1 \\ x_2 \\ x_3 \end{pmatrix}$$

$$-2 + 1 + (-4) - (-1) - (-2) - 4 = -6 \qquad |A| = -6$$

$$A = \begin{pmatrix} 1 & 1 & 1 \\ -2 & 1 & -1 \\ -1 & 2 & -2 \end{pmatrix} = \begin{matrix} -2-(-2) = 0 & 4 - 1 = 3 & -4-(-1) = -3 \\ -2-2 = -4 & -2-(-1) = -1 & 2-(-1) = 3 \\ -1-1 = -2 & -1-(-2) = 1 & 1-(-2) = 3 \end{matrix}$$

$$A^* = \begin{pmatrix} 0 & 3 & -3 \\ -4 & -1 & 3 \\ -2 & 1 & 3 \end{pmatrix} \quad A^* = \begin{pmatrix} 0 & -3 & -3 \\ 4 & -1 & -3 \\ -2 & -1 & 3 \end{pmatrix} \quad (A^*)^t = \begin{pmatrix} 0 & 4 & -2 \\ -3 & -1 & -1 \\ -3 & -3 & 3 \end{pmatrix}$$

$$A^{-1} = \frac{1}{-6} \begin{pmatrix} 0 & 4 & -2 \\ -3 & -1 & -1 \\ -3 & -3 & 3 \end{pmatrix} = \begin{pmatrix} 0 & -2/3 & 1/3 \\ 1/2 & 1/6 & 1/6 \\ 1/2 & 1/2 & -1/2 \end{pmatrix}$$

$$X = \begin{pmatrix} x_1 \\ x_2 \\ x_3 \end{pmatrix} = \begin{pmatrix} 0 & -2/3 & 1/3 \\ 1/2 & 1/6 & 1/6 \\ 1/2 & 1/2 & -1/2 \end{pmatrix} \begin{pmatrix} 6 \\ -5 \\ -1 \end{pmatrix} = \begin{pmatrix} 3 \\ 2 \\ 1 \end{pmatrix}$$

$$x_1 = 0 \times 6 + {-2/3} \times (-5) + 1/3 \times (-1) = 3$$

$$x_2 = 1/2 \times 6 + 1/6 \times (-5) + 1/6 \times (-1) = 2$$

$$x_3 = 1/2 \times 6 + 1/2 \times (-5) + {-1/2} \times (-1) = 1$$

Sean las matrices: $A = \begin{bmatrix} 2 & -4 & 1 \\ -1 & -3 & 2 \\ 3 & 1 & -3 \end{bmatrix}$, $B = \begin{bmatrix} -2 & 2 & 1 \\ 2 & 3 & -2 \\ 3 & 1 & -4 \end{bmatrix}$, $C = \begin{bmatrix} -5 & 2 & -1 \\ 3 & -2 & 1 \\ -4 & 2 & 3 \end{bmatrix}$

Resuelva:

3. Determinante |A| por el método de Laplace (adjunta o cofactores)

3) $A = \begin{pmatrix} 2 & -4 & 1 \\ -1 & -3 & 2 \\ 3 & 1 & -3 \end{pmatrix} \quad \begin{pmatrix} + & - & + \\ - & + & - \\ + & - & + \end{pmatrix}$

$2\begin{vmatrix} -3 & 2 \\ 1 & -3 \end{vmatrix} \quad 4\begin{vmatrix} -1 & 2 \\ 3 & -3 \end{vmatrix} \quad 1\begin{vmatrix} -1 & -3 \\ 3 & 1 \end{vmatrix}$

$2(9-2) + 4(3-6) + 1(-1+9)$

$2(7) + 4(-3) + 1(8)$

$14 + (-12) + 8 = 10$

Determinante por Cofactores R// $|A| = 10$

4. Determinante |B| por el método de Laplace (adjunta o cofactores)

4)

$$B = \begin{pmatrix} -2 & 2 & 1 \\ 2 & 3 & -2 \\ 3 & 1 & -4 \end{pmatrix} \quad \begin{pmatrix} + & - & + \\ - & + & - \\ + & - & + \end{pmatrix}$$

$$-2\begin{vmatrix} 2 & -2 \\ 3 & -4 \end{vmatrix} + 3\begin{vmatrix} -2 & 1 \\ 3 & -4 \end{vmatrix} - 1\begin{vmatrix} -2 & 1 \\ 2 & -2 \end{vmatrix}$$

$$-2(-8+6) + 3(8-3) - 1(4-2)$$

$$-2(-2) + 3(5) - 1(2)$$

$$4 + 15 - 2 = 17$$

Determinante por Cofactores R// $|B| = 17$

5. Determinante |C| por el método de Laplace (adjunta o cofactores)

5)

$$C = \begin{pmatrix} -5 & 2 & -1 \\ 3 & -2 & 1 \\ -4 & 2 & 3 \end{pmatrix} \quad \begin{pmatrix} + & - & + \\ - & + & - \\ + & - & + \end{pmatrix}$$

$$-3\begin{vmatrix} 2 & -1 \\ 2 & 3 \end{vmatrix} - 2\begin{vmatrix} -5 & -1 \\ -4 & 3 \end{vmatrix} - 1\begin{vmatrix} -5 & 2 \\ -4 & 2 \end{vmatrix}$$

$$-3(6+2) - 2(-15-4) - 1(-10+8)$$

$$-3(8) - 2(-19) - 1(-2)$$

$$-24 + 38 + 2 = 16$$

Determinante por Cofactores R// $|C| = 16$

6. A^{-1} por el método de Eliminación de Gauss

$$F_1/2 = F_1$$

6)

$$A = \left(\begin{array}{ccc|ccc} 2 & -4 & 1 & 1 & 0 & 0 \\ -1 & -3 & 2 & 0 & 1 & 0 \\ 3 & 1 & -3 & 0 & 0 & 1 \end{array}\right) = \begin{array}{ll} 2/2 = 1 & 1/2 = \frac{1}{2} \\ -4/2 = -2 & 0/2 = 0 \\ 1/2 = \frac{1}{2} & 0/2 = 0 \end{array}$$

$$F_2 - (-1) \times F_1 = F_2$$

$$\left(\begin{array}{ccc|ccc} 1 & -2 & \frac{1}{2} & \frac{1}{2} & 0 & 0 \\ -1 & -3 & 2 & 0 & 1 & 0 \\ 3 & 1 & -3 & 0 & 0 & 1 \end{array}\right) = \begin{array}{ll} -1-(-1)\times 1 = 0 & 0-(-1)\times \frac{1}{2} = \frac{1}{2} \\ -3-(-1)\times(-2) = -5 & 1-(-1)\times 0 = 1 \\ 2-(-1)\times \frac{1}{2} = \frac{5}{2} & 0-(-1)\times 0 = 0 \end{array}$$

$$F_3 - 3 \times F_1 = F_3$$

$$\left(\begin{array}{ccc|ccc} 1 & -2 & \frac{1}{2} & \frac{1}{2} & 0 & 0 \\ 0 & -5 & \frac{5}{2} & \frac{1}{2} & 1 & 0 \\ 3 & 1 & -3 & 0 & 0 & 1 \end{array}\right) = \begin{array}{ll} 3-3\times 1 = 0 & 0-3\times \frac{1}{2} = -\frac{3}{2} \\ 1-3\times(-2) = 7 & 0-3\times 0 = 0 \\ -3-3\times \frac{1}{2} = -\frac{9}{2} & 1-3\times 0 = 1 \end{array}$$

$$F_2/(-5) = F_2$$

$$\left(\begin{array}{ccc|ccc} 1 & -2 & \frac{1}{2} & \frac{1}{2} & 0 & 0 \\ 0 & -5 & \frac{5}{2} & \frac{1}{2} & 1 & 0 \\ 0 & 7 & -\frac{9}{2} & -\frac{3}{2} & 0 & 1 \end{array}\right) = \begin{array}{ll} 0/(-5) = 0 & \frac{1}{2}/(-5) = -\frac{1}{10} \\ -5/(-5) = 1 & 1/(-5) = -\frac{1}{5} \\ \frac{5}{2}/(-5) = -\frac{1}{2} & 0/(-5) = 0 \end{array}$$

$$F_3 - 7 \times F_2 = F_3$$

$$\left(\begin{array}{ccc|ccc} 1 & -2 & \frac{1}{2} & \frac{1}{2} & 0 & 0 \\ 0 & 1 & -\frac{1}{2} & -\frac{1}{10} & -\frac{1}{5} & 0 \\ 0 & 7 & -\frac{9}{2} & -\frac{3}{2} & 0 & 1 \end{array}\right) = \begin{array}{ll} 0-7\times 0 = 0 & -\frac{3}{2}-7\times -\frac{1}{10} = -\frac{4}{5} \\ 7-7\times 1 = 0 & 0-7\times -\frac{1}{5} = \frac{7}{5} \\ -\frac{9}{2}-7\times -\frac{1}{2} = -1 & 1-7\times 0 = 1 \end{array}$$

$$F_3/(-1) = F_3$$

$$\left(\begin{array}{ccc|ccc} 1 & -2 & \frac{1}{2} & \frac{1}{2} & 0 & 0 \\ 0 & 1 & -\frac{1}{2} & -\frac{1}{10} & -\frac{1}{5} & 0 \\ 0 & 0 & -1 & -\frac{4}{5} & \frac{7}{5} & 1 \end{array}\right) = \begin{array}{ll} 0/(-1) = 0 & -\frac{4}{5}/(-1) = \frac{4}{5} \\ 0/(-1) = 0 & \frac{7}{5}/(-1) = -\frac{7}{5} \\ -1/(-1) = 1 & 1/(-1) = -1 \end{array}$$

$$F_2 - -\frac{1}{2} \times F_3 = F_2$$

$$\left(\begin{array}{ccc|ccc} 1 & -2 & \frac{1}{2} & \frac{1}{2} & 0 & 0 \\ 0 & 1 & -\frac{1}{2} & -\frac{1}{10} & -\frac{1}{5} & 0 \\ 0 & 0 & 1 & \frac{4}{5} & -\frac{7}{5} & -1 \end{array}\right) = \begin{array}{ll} 0 - -\frac{1}{2}\times 0 = 0 & -\frac{1}{10} - -\frac{1}{2}\times \frac{4}{5} = \frac{3}{10} \\ 1 - -\frac{1}{2}\times 0 = 1 & -\frac{1}{5} - -\frac{1}{2}\times -\frac{7}{5} = -\frac{9}{10} \\ -\frac{1}{2} - -\frac{1}{2}\times 1 = 0 & 0 - -\frac{1}{2}\times -1 = -\frac{1}{2} \end{array}$$

$$F_1 - \tfrac{1}{2} \times F_3 = F_1$$

$$\left(\begin{array}{ccc|ccc} 1 & -2 & 1/2 & 1/2 & 0 & 0 \\ 0 & 1 & 0 & 3/10 & -9/10 & -1/2 \\ 0 & 0 & 1 & 4/5 & -7/5 & -1 \end{array}\right) = \begin{array}{ll} 1 - 1/2 \times 0 = 1 & 1/2 - 1/2 \times 4/5 = 1/10 \\ -2 - 1/2 \times 0 = -2 & 0 - 1/2 \times -7/5 = 7/10 \\ 1/2 - 1/2 \times 1 = 0 & 0 - 1/2 \times -1 = 1/2 \end{array}$$

$$F_1 - (-2) \times F_2 = F_1$$

$$\left(\begin{array}{ccc|ccc} 1 & -2 & 0 & 1/10 & 7/10 & 1/2 \\ 0 & 1 & 0 & 3/10 & -9/10 & -1/2 \\ 0 & 0 & 1 & 4/5 & -7/5 & -1 \end{array}\right) = \begin{array}{ll} 1 - (-2) \times 0 = 1 & 1/10 - (-2) \times 3/10 = 7/10 \\ -2 - (-2) \times 1 = 0 & 7/10 - (-2) \times -9/10 = -11/10 \\ 0 - (-2) \times 0 = 0 & 1/2 - (-2) \times -1/2 = -1/2 \end{array}$$

$$\left(\begin{array}{ccc|ccc} 1 & 0 & 0 & 7/10 & -11/10 & -1/2 \\ 0 & 1 & 0 & 3/10 & -9/10 & -1/2 \\ 0 & 0 & 1 & 4/5 & -7/5 & -1 \end{array}\right)$$

$$A^{-1} = \begin{pmatrix} 7/10 & -11/10 & -1/2 \\ 3/10 & -9/10 & -1/2 \\ 4/5 & -7/5 & -1 \end{pmatrix}$$

7. B^{-1} por el método de Eliminación de Gauss

$B =$

$F_1 / (-2) = F_1$

$$\left(\begin{array}{ccc|ccc} -2 & 2 & 1 & 1 & 0 & 0 \\ 2 & 3 & -2 & 0 & 1 & 0 \\ 3 & 1 & -4 & 0 & 0 & 1 \end{array}\right) =$$

$-2/(-2) = 1$ $\quad$ $1/(-2) = -\frac{1}{2}$

$2/(-2) = -1$ $\quad$ $0/(-2) = 0$

$1/(-2) = -\frac{1}{2}$ $\quad$ $0/(-2) = 0$

$F_2 - 2 \times F_1 = F_2$

$$\left(\begin{array}{ccc|ccc} 1 & -1 & -\frac{1}{2} & -\frac{1}{2} & 0 & 0 \\ 2 & 3 & -2 & 0 & 1 & 0 \\ 3 & 1 & -4 & 0 & 0 & 1 \end{array}\right) =$$

$2 - 2 \times 1 = 0$ $\quad$ $0 - 2 \times -\frac{1}{2} = 1$

$3 - 2 \times (-1) = 5$ $\quad$ $1 - 2 \times 0 = 1$

$-2 - 2 \times -\frac{1}{2} = -1$ $\quad$ $0 - 2 \times 0 = 0$

$F_3 - 3 \times F_1 = F_3$

$$\left(\begin{array}{ccc|ccc} 1 & -1 & -\frac{1}{2} & -\frac{1}{2} & 0 & 0 \\ 0 & 5 & -1 & 1 & 1 & 0 \\ 3 & 1 & -4 & 0 & 0 & 1 \end{array}\right) =$$

$3 - 3 \times 1 = 0$ $\quad$ $0 - 3 \times -\frac{1}{2} = \frac{3}{2}$

$1 - 3 \times (-1) = 4$ $\quad$ $0 - 3 \times 0 = 0$

$-4 - 3 \times -\frac{1}{2} = -\frac{5}{2}$ $\quad$ $1 - 3 \times 0 = 1$

$F_2 / 5 = F_2$

$$\left(\begin{array}{ccc|ccc} 1 & -1 & -\frac{1}{2} & -\frac{1}{2} & 0 & 0 \\ 0 & 5 & -1 & 1 & 1 & 0 \\ 0 & 4 & -\frac{5}{2} & \frac{3}{2} & 0 & 1 \end{array}\right) =$$

$0/5 = 0$ $\quad$ $1/5 = \frac{1}{5}$

$5/5 = 1$ $\quad$ $1/5 = \frac{1}{5}$

$-1/5 = -\frac{1}{5}$ $\quad$ $0/5 = 0$

$F_3 - 4 \times F_2 = F_3$

$$\left(\begin{array}{ccc|ccc} 1 & -1 & -\frac{1}{2} & -\frac{1}{2} & 0 & 0 \\ 0 & 1 & -\frac{1}{5} & \frac{1}{5} & \frac{1}{5} & 0 \\ 0 & 4 & -\frac{5}{2} & \frac{3}{2} & 0 & 1 \end{array}\right) =$$

$0 - 4 \times 0 = 0$ $\quad$ $\frac{3}{2} - 4 \times \frac{1}{5} = \frac{7}{10}$

$4 - 4 \times 1 = 0$ $\quad$ $0 - 4 \times \frac{1}{5} = -\frac{4}{5}$

$-\frac{5}{2} - 4 \times -\frac{1}{5} = -\frac{17}{10}$ $\quad$ $1 - 4 \times 0 = 1$

$F_3 / -\frac{17}{10} = F_3$

$$\left(\begin{array}{ccc|ccc} 1 & -1 & -\frac{1}{2} & -\frac{1}{2} & 0 & 0 \\ 0 & 1 & -\frac{1}{5} & \frac{1}{5} & \frac{1}{5} & 0 \\ 0 & 0 & -\frac{17}{10} & \frac{7}{10} & -\frac{4}{5} & 1 \end{array}\right) =$$

$0 / -\frac{17}{10} = 0$ $\quad$ $\frac{7}{10} / -\frac{17}{10} = -\frac{7}{17}$

$0 / -\frac{17}{10} = 0$ $\quad$ $-\frac{4}{5} / -\frac{17}{10} = \frac{8}{17}$

$-\frac{17}{10} / -\frac{17}{10} = 1$ $\quad$ $1 / -\frac{17}{10} = -\frac{10}{17}$

$F_2 - -\frac{1}{5} \times F_3 = F_2$

$$\left(\begin{array}{ccc|ccc} 1 & -1 & -\frac{1}{2} & -\frac{1}{2} & 0 & 0 \\ 0 & 1 & -\frac{1}{5} & \frac{1}{5} & \frac{1}{5} & 0 \\ 0 & 0 & 1 & -\frac{7}{17} & \frac{8}{17} & -\frac{10}{17} \end{array}\right) =$$

$0 - -\frac{1}{5} \times 0 = 0$ $\quad$ $\frac{1}{5} - -\frac{1}{5} \times -\frac{7}{17} = \frac{2}{17}$

$1 - -\frac{1}{5} \times 0 = 1$ $\quad$ $\frac{1}{5} - -\frac{1}{5} \times \frac{8}{17} = \frac{5}{17}$

$-\frac{1}{5} - -\frac{1}{5} \times 1 = 0$ $\quad$ $0 - -\frac{1}{5} \times -\frac{10}{17} = -\frac{2}{17}$

$$F_1 - {-1/2} \times F_3 = F_1$$

$$\left(\begin{array}{ccc|ccc} 1 & -1 & -1/2 & -1/2 & 0 & 0 \\ 0 & 1 & 0 & 2/17 & 5/17 & -2/17 \\ 0 & 0 & 1 & -7/17 & 8/17 & -10/17 \end{array}\right) =$$

$1 - {-1/2} \times 0 = 1$

$-1 - {-1/2} \times 0 = -1$

$-1/2 - {-1/2} \times 1 = 0$

$-1/2 - {-1/2} \times {-7/17} = -12/17$

$0 - {-1/2} \times 8/17 = 4/17$

$0 - {-1/2} \times {-10/17} = -5/17$

$$\left(\begin{array}{ccc|ccc} 1 & -1 & 0 & -12/17 & 4/17 & -5/17 \\ 0 & 1 & 0 & 2/17 & 5/17 & -2/17 \\ 0 & 0 & 1 & -7/17 & 8/17 & -10/17 \end{array}\right) =$$

$$F_1 - (-1) \times F_2 = F_1$$

$1 - (-1) \times 0 = 1$

$-1 - (-1) \times 1 = 0$

$0 - (-1) \times 0 = 0$

$-12/17 - (-1) \times 2/17 = -10/17$

$4/17 - (-1) \times 5/17 = 9/17$

$-5/17 - (-1) \times {-2/17} = -7/17$

$$\left(\begin{array}{ccc|ccc} 1 & 0 & 0 & -10/17 & 9/17 & -7/17 \\ 0 & 1 & 0 & 2/17 & 5/17 & -2/17 \\ 0 & 0 & 1 & -7/17 & 8/17 & -10/17 \end{array}\right)$$

$$B^{-1} = \begin{pmatrix} -10/17 & 9/17 & -7/17 \\ 2/17 & 5/17 & -2/17 \\ -7/17 & 8/17 & -10/17 \end{pmatrix}$$

8. C^{-1} por el método de Eliminación de Gauss

8)

$$C = \left(\begin{array}{ccc|ccc} -5 & 2 & -1 & 1 & 0 & 0 \\ 3 & -2 & 1 & 0 & 1 & 0 \\ -4 & 2 & 3 & 0 & 0 & 1 \end{array}\right) =$$

$F_1 / (-5) = F_1$

$-5/(-5) = 1 \qquad 1/(-5) = -1/5$

$2/(-5) = -2/5 \qquad 0/(-5) = 0$

$-1/(-5) = 1/5 \qquad 0/(-5) = 0$

$$\left(\begin{array}{ccc|ccc} 1 & -2/5 & 1/5 & -1/5 & 0 & 0 \\ 3 & -2 & 1 & 0 & 1 & 0 \\ -4 & 2 & 3 & 0 & 0 & 1 \end{array}\right) =$$

$F_2 - 3 \times F_1 = F_2$

$3 - 3 \times 1 = 0 \qquad 0 - 3 \times -1/5 = 3/5$

$-2 - 3 \times (-2/5) = -4/5 \qquad 1 - 3 \times 0 = 1$

$1 - 3 \times 1/5 = 2/5 \qquad 0 - 3 \times 0 = 0$

$$\left(\begin{array}{ccc|ccc} 1 & -2/5 & 1/5 & -1/5 & 0 & 0 \\ 0 & -4/5 & 2/5 & 3/5 & 1 & 0 \\ -4 & 2 & 3 & 0 & 0 & 1 \end{array}\right) =$$

$F_3 - (-4) \times F_1 = F_3$

$-4 - (-4) \times 1 = 0 \qquad 0 - (-4) \times (-1/5) = -4/5$

$2 - (-4) \times -2/5 = 2/5 \qquad 0 - (-4) \times 0 = 0$

$3 - (-4) \times 1/5 = 19/5 \qquad 1 - (-4) \times 0 = 1$

$$\left(\begin{array}{ccc|ccc} 1 & -2/5 & 1/5 & -1/5 & 0 & 0 \\ 0 & -4/5 & 2/5 & 3/5 & 1 & 0 \\ 0 & 2/5 & 19/5 & -4/5 & 0 & 1 \end{array}\right) =$$

$F_2 / -4/5 = F_2$

$0 / (-4/5) = 0 \qquad 3/5 / -4/5 = -3/4$

$-4/5 / (-4/5) = 1 \qquad 1 / -4/5 = -5/4$

$2/5 / (-4/5) = -1/2 \qquad 0 / -4/5 = 0$

$$\left(\begin{array}{ccc|ccc} 1 & -2/5 & 1/5 & -1/5 & 0 & 0 \\ 0 & 1 & -1/2 & -3/4 & -5/4 & 0 \\ 0 & 2/5 & 19/5 & -4/5 & 0 & 1 \end{array}\right) =$$

$F_3 - 2/5 \times F_2 = F_3$

$0 - 2/5 \times 0 = 0 \qquad -4/5 - 2/5 \times (-3/4) = -1/2$

$2/5 - 2/5 \times 1 = 0 \qquad 0 - 2/5 \times (-5/4) = 1/2$

$19/5 - 2/5 \times -1/2 = 4 \qquad 1 - 2/5 \times 0 = 1$

$$\left(\begin{array}{ccc|ccc} 1 & -2/5 & 1/5 & -1/5 & 0 & 0 \\ 0 & 1 & -1/2 & -3/4 & -5/4 & 0 \\ 0 & 0 & 4 & -1/2 & 1/2 & 1 \end{array}\right) =$$

$F_3 / 4 = F_3$

$0 / 4 = 0 \qquad -1/2 / 4 = -1/8$

$0 / 4 = 0 \qquad 1/2 / 4 = 1/8$

$4 / 4 = 1 \qquad 1 / 4 = 1/4$

$$\left(\begin{array}{ccc|ccc} 1 & -2/5 & 1/5 & -1/5 & 0 & 0 \\ 0 & 1 & -1/2 & -3/4 & -5/4 & 0 \\ 0 & 0 & 1 & -1/8 & 1/8 & 1/4 \end{array}\right) =$$

$F_2 - (-1/2) \times F_3 = F_2$

$0 - (-1/2) \times 0 = 0 \qquad -3/4 - (-1/2) \times -1/8 = -13/16$

$1 - (-1/2) \times 0 = 1 \qquad -5/4 - (-1/2) \times 1/8 = -19/16$

$-1/2 - (-1/2) \times 1 = 0 \qquad 0 - (-1/2) \times 1/4 = 1/8$

$$F_1 - \frac{1}{5} \times F_3 = F_1$$

$$\left(\begin{array}{ccc|ccc} 1 & -\frac{2}{5} & \frac{1}{5} & -\frac{1}{5} & 0 & 0 \\ 0 & 1 & 0 & -\frac{13}{16} & -\frac{19}{16} & \frac{1}{8} \\ 0 & 0 & 1 & -\frac{1}{8} & \frac{1}{8} & \frac{1}{4} \end{array}\right)$$

$$1 - \frac{1}{5} \times 0 = 1 \qquad -\frac{1}{5} - \frac{1}{5} \times -\frac{1}{8} = -\frac{7}{40}$$

$$-\frac{2}{5} - \frac{1}{5} \times 0 = -\frac{2}{5} \qquad 0 - \frac{1}{5} \times \frac{1}{8} = -\frac{1}{40}$$

$$\frac{1}{5} - \frac{1}{5} \times 1 = 0 \qquad 0 - \frac{1}{5} \times \frac{1}{4} = -\frac{1}{20}$$

$$\left(\begin{array}{ccc|ccc} 1 & -\frac{2}{5} & 0 & -\frac{7}{40} & -\frac{1}{40} & -\frac{1}{20} \\ 0 & 1 & 0 & -\frac{13}{16} & -\frac{19}{16} & \frac{1}{8} \\ 0 & 0 & 1 & -\frac{1}{8} & \frac{1}{8} & \frac{1}{4} \end{array}\right)$$

$$F_1 - -\frac{2}{5} \times F_2 = F_1$$

$$1 - -\frac{2}{5} \times 0 = 1 \qquad -\frac{7}{40} - -\frac{2}{5} \times -\frac{13}{16} = -\frac{1}{2}$$

$$-\frac{2}{5} - -\frac{2}{5} \times 1 = 0 \qquad -\frac{1}{40} - -\frac{2}{5} \times -\frac{19}{16} = -\frac{1}{2}$$

$$0 - -\frac{2}{5} \times 0 = 0 \qquad -\frac{1}{20} - -\frac{2}{5} \times \frac{1}{8} = 0$$

$$\left(\begin{array}{ccc|ccc} 1 & 0 & 0 & -\frac{1}{2} & -\frac{1}{2} & 0 \\ 0 & 1 & 0 & -\frac{13}{16} & -\frac{19}{16} & \frac{1}{8} \\ 0 & 0 & 1 & -\frac{1}{8} & \frac{1}{8} & \frac{1}{4} \end{array}\right)$$

$$C^{-1} = \begin{pmatrix} -\frac{1}{2} & -\frac{1}{2} & 0 \\ -\frac{13}{16} & -\frac{19}{16} & \frac{1}{8} \\ -\frac{1}{8} & \frac{1}{8} & \frac{1}{4} \end{pmatrix}$$

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