



ÁLGEBRA LINEAL

Stanley I. **Grossman S.**
José Job **Flores Godoy**
OCTAVA EDICIÓN

**Mc
Graw
Hill**

Respuesta a los problemas impares

Capítulo 2

2.1 Definiciones generales

1. $\begin{pmatrix} 1 \\ 1 \\ -4 \end{pmatrix}$.

3. $\begin{pmatrix} -5 \\ 15 \\ -40 \end{pmatrix}$.

5. $\begin{pmatrix} 29 \\ -17 \\ 4 \end{pmatrix}$.

7. $\begin{pmatrix} 12 \\ -4 \\ -12 \end{pmatrix}$.

9. $\begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix}$.

11. $\begin{pmatrix} -21 \\ 13 \\ 0 \end{pmatrix}$.

13. $\begin{pmatrix} -59 \\ 35 \\ -4 \end{pmatrix}$.

15. $(-5 \ 1 \ 14)$.

17. $(-16 \ -8 \ 36)$.

19. $(-23 \ 13 \ 71)$.

21. $(-4 \ 5 \ 6)$.

23. $(-3 \ -3 \ 8)$.

25. $(-14 \ -11 \ 32)$.

27. $\begin{pmatrix} 0 & 12 \\ -6 & -6 \\ 0 & -3 \end{pmatrix}$.

29. $\begin{pmatrix} 5 & 0 \\ 1 & 2 \\ 6 & -1 \end{pmatrix}$.

31. $\begin{pmatrix} 10 & -12 \\ 8 & 10 \\ 12 & 1 \end{pmatrix}$.

33. $\begin{pmatrix} 9 & -7 \\ 14 & 8 \\ 3 & -2 \end{pmatrix}$.

35. $\begin{pmatrix} 8 & 15 \\ -3 & -4 \\ 7 & -6 \end{pmatrix}$.

37. $\begin{pmatrix} -7 & -5 \\ 4 & 0 \\ -11 & 2 \end{pmatrix}$.

39. $\begin{pmatrix} 32 & 29 \\ -11 & -2 \\ 41 & -13 \end{pmatrix}$.

41. $\begin{pmatrix} 9 & -6 \\ -1 & 6 \\ 16 & 1 \end{pmatrix}$.

43. $\begin{pmatrix} -2 & -10 \\ 3 & 5 \\ 0 & 5 \end{pmatrix}$.

45. $\begin{pmatrix} \frac{1}{7} & 0 \\ 0 & \frac{1}{9} \end{pmatrix}$.

47. $\begin{pmatrix} -4 & -4 & 16 \\ 17 & 5 & 0 \\ -7 & 22 & -1 \end{pmatrix}$.

49. $\begin{pmatrix} 6 & 9 & -1 \\ 2 & -5 & 5 \\ -2 & 14 & 3 \end{pmatrix}$.

51. $\begin{pmatrix} -29 & -6 & -8 \\ 38 & 3 & -7 \\ -12 & 7 & -34 \end{pmatrix}$.

53. $\begin{pmatrix} 35 & 6 & 44 \\ -14 & 3 & 13 \\ 0 & 47 & 46 \end{pmatrix}$.

55. $\begin{pmatrix} -\frac{33}{4} & -\frac{1}{2} & -18 \\ -\frac{11}{4} & -\frac{5}{2} & -\frac{15}{4} \\ \frac{11}{4} & -\frac{87}{4} & -\frac{49}{4} \end{pmatrix}$.

57. $\begin{pmatrix} 24 & 6 & 12 \\ -17 & -3 & 5 \\ 5 & 14 & 24 \end{pmatrix}$.

2.2 Productos vectorial y matricial

1. 31.

3. 3.

11. 48.

13. -1.

15. 290.

17. 12.

19. $\begin{pmatrix} 0 \\ \frac{27}{13} \\ -\frac{18}{13} \end{pmatrix}$.

21. 1

27. Matrices incompatibles.

29. Matrices incompatibles.

31. $\begin{pmatrix} 2 & 0 \\ 1 & -1 \\ -3 & 4 \end{pmatrix}$.

33. $\begin{pmatrix} \frac{35}{3} & -\frac{46}{3} \\ \frac{61}{3} & \frac{265}{6} \end{pmatrix}$.

39. $\alpha = -9$.

51. No ortogonales.

55. Ortogonales

57. $\alpha = 4 + 6\beta$, $\beta \in \mathbb{R}$.

83. 15.

85. 6.

91. 74.

97. $\sum_{k=1}^5 (-1)^{n+1} x^{2n-1}$.101. $\sum_{k=1}^2 (2+k)^{k+1} + \sum_{k=1}^2 (4+k)^{5+k}$.

2.3 Matrices y sistemas de ecuaciones lineales

1.
$$\begin{pmatrix} 1 & 3 & 3 \\ -5 & 9 & 6 \\ 2 & -2 & 7 \end{pmatrix} \mathbf{x} = \begin{pmatrix} 12 \\ 7 \\ 6 \end{pmatrix}.$$

3.
$$\begin{pmatrix} 4 & 10 & -6 \\ 3 & -5 & 4 \end{pmatrix} \mathbf{x} = \begin{pmatrix} -9 \\ 5 \end{pmatrix}.$$

5.
$$\begin{pmatrix} 8 & -2 & -3 \\ 7 & -2 & 4 \end{pmatrix} \mathbf{x} = \begin{pmatrix} 2 \\ 1 \end{pmatrix}.$$

7.
$$\begin{pmatrix} 1 & 0 & 0 & 1 \\ 0 & 1 & 1 & 0 \\ 1 & 0 & 1 & 1 \\ 0 & 0 & 1 & -1 \end{pmatrix} \mathbf{x} = \begin{pmatrix} 5 \\ 7 \\ 0 \\ 2 \end{pmatrix}.$$

9.
$$\begin{aligned} -3x_1 + 5x_2 &= 4 \\ 4x_1 + 3x_2 &= -1 \end{aligned}$$

$$7x_1 + 8x_2 + 3x_3 = 2$$

17.
$$\begin{aligned} -4x_1 - 2x_2 &= 1. \\ 6x_1 - 5x_2 - 2x_3 &= 8 \end{aligned}$$

19.
$$\begin{aligned} 6x_1 - 7x_2 + 9x_3 &= -8 \\ 6x_1 - 7x_2 - 6x_3 &= -2 \end{aligned}$$

25.
$$x_1 = \frac{29}{8}, x_2 = \frac{67}{24}, x_3 = 0.$$

27.
$$x_1 = \frac{55}{31}, x_2 = -\frac{52}{31}, x_3 = -\frac{101}{93}.$$

2.4 Inversa de una matriz cuadrada

1. No existe inversa.

5.
$$A^{-1} = \begin{pmatrix} -\frac{11}{2} & \frac{5}{2} \\ \frac{7}{2} & -\frac{3}{2} \end{pmatrix}.$$

17.
$$\begin{pmatrix} \frac{1}{2} & -\frac{1}{2} & \frac{1}{2} \\ \frac{1}{2} & \frac{1}{2} & -\frac{1}{2} \\ -\frac{1}{2} & \frac{1}{2} & \frac{1}{2} \end{pmatrix}.$$

29 c.
$$\begin{pmatrix} -\frac{1}{2}i & 0 & \frac{1}{4} + \frac{1}{4}i \\ \frac{1}{2} & 0 & \frac{1}{4} - \frac{1}{4}i \\ -i & 1 & 0 \end{pmatrix}.$$

39. La matriz no tiene inversa cuando $a = -\frac{\sqrt{7}}{2} + i\frac{1}{2}$ o

$$a = \frac{\sqrt{7}}{2} + i\frac{1}{2}. \text{ Con } a = -\frac{\sqrt{7}}{2} + i\frac{1}{2}, x = \begin{pmatrix} -2 \\ -\sqrt{7} + i \\ -1 + i\sqrt{7} \end{pmatrix}.$$

$$\text{Con } a = \frac{\sqrt{7}}{2} + i\frac{1}{2}, x = \begin{pmatrix} 2 \\ -\sqrt{7} - i \\ 1 + i\sqrt{7} \end{pmatrix}.$$

41.
$$x = \begin{pmatrix} -19 \\ -3 \\ 36 \end{pmatrix}$$

2.5 Transpuesta de una matriz

3.
$$\begin{pmatrix} 3 & 6 \\ 5 & 10 \end{pmatrix}.$$

11.
$$\begin{pmatrix} \alpha & \epsilon \\ \beta & \zeta \\ \gamma & \theta \\ \delta & \omega \end{pmatrix}.$$

25a. No es antisimétrica.

25c. No es antisimétrica.

33.
$$(A^T)^{-1} = \begin{pmatrix} \frac{1}{16} & \frac{1}{4} \\ -\frac{1}{4} & 0 \end{pmatrix} = (A^{-1})^T.$$

35.
$$(A^T)^{-1} = \begin{pmatrix} \frac{1}{14} & \frac{2}{7} \\ -\frac{2}{7} & -\frac{1}{7} \end{pmatrix} = (A^{-1})^T.$$

37.
$$(A^T)^{-1} = \begin{pmatrix} 2 & -3 & -3 \\ 7 & -9 & -10 \\ -6 & 8 & 9 \end{pmatrix} = (A^{-1})^T.$$

39.
$$\begin{pmatrix} 14 & 14 & 12 \\ 14 & 18 & -4 \\ 12 & -4 & -8 \end{pmatrix}.$$

41.
$$\begin{pmatrix} 40 & 24 & -32 \\ 24 & 34 & -8 \\ -32 & -8 & 32 \end{pmatrix}.$$

2.6 Matrices elementales y matrices inversas

7. No es una matriz elemental.

9. No es una matriz elemental.

19.
$$\begin{pmatrix} -6 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}.$$

31.
$$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ \pi & 0 & 1 \end{pmatrix}.$$

37.
$$\begin{pmatrix} 1 & 0 \\ \frac{2}{3} & 1 \end{pmatrix}.$$

41.
$$\begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}.$$

43.
$$\begin{pmatrix} 1 & 1 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}.$$

45.
$$\begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}.$$

51. $\begin{pmatrix} 0 & 0 & 1 \\ 0 & 1 & 0 \\ 1 & 0 & 0 \end{pmatrix}$.

59. $\begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & -\beta & 0 & 1 \end{pmatrix}$.

61. $\begin{pmatrix} 0 & 0 & 0 & 1 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 1 & 0 & 0 & 0 \end{pmatrix}$.

65. $A = \begin{pmatrix} -3 & 0 \\ 0 & 1 \end{pmatrix} \begin{pmatrix} 1 & 0 \\ 1 & 1 \end{pmatrix} \begin{pmatrix} 1 & 0 \\ 0 & -\frac{5}{3} \end{pmatrix} \begin{pmatrix} 1 & -\frac{1}{3} \\ 0 & 1 \end{pmatrix}$.

67. $A = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ -a & 0 & 1 \end{pmatrix} \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1-a^2 \end{pmatrix} \dots$

$\dots \begin{pmatrix} 1 & 0 & -a \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$

69. $A = \begin{pmatrix} 1 & 3 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix} \begin{pmatrix} \frac{1}{4} & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix} \begin{pmatrix} 1 & 0 & 0 \\ 1 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix} \dots$

$\dots \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 2 & 0 & 1 \end{pmatrix} \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & -3 & 1 \end{pmatrix}$

$A = \begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 3 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix} \begin{pmatrix} -2 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix} \dots$

71. $\dots \begin{pmatrix} 1 & 0 & 0 & 0 \\ -3 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix} \begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & \frac{1}{2} & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix} \dots$

$\dots \begin{pmatrix} 1 & -\frac{3}{2} & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix}$

$A = \begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 3 & 0 & 0 & 1 \end{pmatrix} \begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ -4 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix} \dots$

73. $\dots \begin{pmatrix} 1 & 0 & 0 & 0 \\ 5 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix} \begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 2 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix} \dots$

$\dots \begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 6 & 0 & 1 \end{pmatrix} \begin{pmatrix} 1 & 0 & 0 & -2 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix}$

85. $\begin{pmatrix} 1 & 0 \\ -2 & 1 \end{pmatrix} \begin{pmatrix} 1 & -2 \\ 0 & -1 \end{pmatrix}$.

87. $\begin{pmatrix} 1 & 0 & 0 \\ 3 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix} \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ -3 & 0 & 1 \end{pmatrix} \begin{pmatrix} 1 & 0 & 2 \\ 0 & 1 & -2 \\ 0 & 0 & 7 \end{pmatrix}$.

91. $\begin{pmatrix} 1 & 0 & 0 \\ 3 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix} \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ -3 & 0 & 1 \end{pmatrix} \dots$

$\dots \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & \frac{5}{2} & 1 \end{pmatrix} \begin{pmatrix} 1 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 1 \end{pmatrix}$

2.7 Factorizaciones LU de una matriz

3. $\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix} \begin{pmatrix} 1 & 2 \\ 0 & 3 \end{pmatrix}$.

5. $\begin{pmatrix} 1 & 0 & 0 \\ -2 & 1 & 0 \\ -5 & \frac{15}{2} & 1 \end{pmatrix} \begin{pmatrix} -1 & 3 & 8 \\ 0 & 2 & 22 \\ 0 & 0 & -118 \end{pmatrix}$.

9. $\begin{pmatrix} 1 & 0 & 0 \\ -1 & 1 & 0 \\ 1 & 0 & 1 \end{pmatrix} \begin{pmatrix} -1 & 2 & 3 \\ 0 & 4 & 1 \\ 0 & 0 & 1 \end{pmatrix}$.

13. $\begin{pmatrix} 1 & 0 & 0 & 0 \\ -2 & 1 & 0 & 0 \\ 1 & \frac{2}{13} & 1 & 0 \\ 0 & -\frac{4}{13} & -5 & 1 \end{pmatrix} \begin{pmatrix} -2 & 3 & -1 & 6 \\ 0 & 13 & 0 & 13 \\ 0 & 0 & -1 & -8 \\ 0 & 0 & 0 & -34 \end{pmatrix}$.

19. $\begin{pmatrix} \frac{9}{2} \\ -\frac{3}{4} \\ 2 \end{pmatrix}$.

25. $\begin{pmatrix} -\frac{560}{109} \\ -\frac{524}{109} \\ -\frac{88}{109} \\ -\frac{968}{109} \end{pmatrix}$.

27. $L = \begin{pmatrix} 1 & 0 \\ \frac{1}{3} & 1 \end{pmatrix}, U = \begin{pmatrix} 3 & 5 \\ 0 & \frac{4}{3} \end{pmatrix}, P = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix},$
 $x = \begin{pmatrix} \frac{19}{4} \\ -\frac{9}{4} \end{pmatrix}$.

29. $L = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}, U = \begin{pmatrix} 1 & 4 \\ 0 & 2 \end{pmatrix}, P = \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix},$
 $x = \begin{pmatrix} -11 \\ \frac{3}{2} \end{pmatrix}$.

31. $L = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & -\frac{2}{5} & 1 \end{pmatrix}, U = \begin{pmatrix} 1 & 1 & 1 \\ 0 & -5 & 1 \\ 0 & 0 & \frac{47}{5} \end{pmatrix},$
 $P = \begin{pmatrix} 0 & 0 & 1 \\ 0 & 1 & 0 \\ 1 & 0 & 0 \end{pmatrix}, x = \begin{pmatrix} -\frac{13}{47} \\ \frac{10}{47} \\ \frac{3}{47} \end{pmatrix}$.

$$35. L = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 2 & 0 & 1 \end{pmatrix}, U = \begin{pmatrix} 2 & 3 & 5 \\ 0 & 5 & -1 \\ 0 & 0 & -17 \end{pmatrix},$$

$$P = \begin{pmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}, x = \begin{pmatrix} -\frac{457}{170} \\ \frac{159}{85} \\ -\frac{11}{17} \end{pmatrix}.$$

$$39. L = \begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & -\frac{1}{2} & 1 & 0 \\ -2 & 0 & -\frac{2}{3} & 1 \end{pmatrix},$$

$$U = \begin{pmatrix} 1 & 2 & -3 & 2 \\ 0 & 4 & -3 & 2 \\ 0 & 0 & \frac{3}{2} & 2 \\ 0 & 0 & 0 & -\frac{14}{3} \end{pmatrix},$$

$$P = \begin{pmatrix} 0 & 0 & 1 & 0 \\ 0 & 1 & 0 & 0 \\ 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix}, x = \begin{pmatrix} 12 \\ \frac{13}{2} \\ 7 \\ -2 \end{pmatrix}.$$

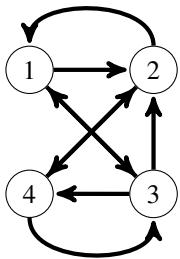
$$45. \begin{pmatrix} 1 & 0 & 0 \\ 6 & 1 & 0 \\ 5 & 1 & 1 \end{pmatrix} \begin{pmatrix} 1 & -3 & 4 \\ 0 & 12 & -20 \\ 0 & 0 & 0 \end{pmatrix}.$$

$$47. \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ \frac{1}{2} & -\frac{1}{2} & 1 \end{pmatrix} \begin{pmatrix} 2 & -3 & 3 \\ 0 & -5 & 1 \\ 0 & 0 & 0 \end{pmatrix}.$$

$$55. \begin{pmatrix} 1 & 0 \\ -\frac{6}{5} & 1 \end{pmatrix} \begin{pmatrix} -5 & -1 & -2 & 4 \\ 0 & -\frac{36}{5} & \frac{3}{5} & \frac{29}{5} \end{pmatrix}.$$

$$57. \begin{pmatrix} 1 & 0 & 0 & 0 & 0 \\ \frac{5}{2} & 1 & 0 & 0 & 0 \\ -3 & -\frac{9}{13} & 1 & 0 & 0 \\ -\frac{3}{2} & -\frac{1}{13} & 68 & 1 & 0 \\ -3 & -\frac{11}{13} & \frac{1}{2} & 0 & 1 \end{pmatrix} \begin{pmatrix} 2 & -4 & -6 \\ 0 & 13 & 20 \\ 0 & 0 & -\frac{2}{13} \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{pmatrix}.$$

2.8 Teoría de gráficas: una aplicación de matrices



5.

Ejercicios de repaso

$$3. \begin{pmatrix} 1 & \frac{1}{2} \\ 0 & 0 \end{pmatrix}, \text{ la matriz no tiene inversa.}$$

$$5. \begin{pmatrix} 1 & -2 & 0 \\ 0 & 0 & 1 \\ 0 & 0 & 0 \end{pmatrix}, \text{ la matriz no tiene inversa.}$$

$$9. A = \begin{pmatrix} 8 & 7 \\ -4 & 1 \end{pmatrix}, b = \begin{pmatrix} -1 \\ -4 \end{pmatrix}, A^{-1} = \begin{pmatrix} \frac{1}{36} & -\frac{7}{36} \\ \frac{1}{9} & \frac{2}{9} \end{pmatrix},$$

$$x = \begin{pmatrix} \frac{3}{4} \\ -1 \end{pmatrix}.$$

13. No existe matriz inversa, el sistema no tienen solución.

15. Matriz simétrica.

$$23. \begin{pmatrix} 1 & 0 & 0 \\ 0 & 0 & -1 \\ 0 & 1 & 0 \end{pmatrix}.$$

$$27. \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & -\frac{3}{4} & 1 \end{pmatrix}.$$

$$29. \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & \frac{2}{7} \\ 0 & 0 & 1 \end{pmatrix}.$$

$$\begin{pmatrix} -\frac{5}{4} & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix} \begin{pmatrix} 1 & 0 & 0 \\ -\frac{1}{4} & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix} \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ \frac{5}{4} & 0 & 1 \end{pmatrix} \dots$$

$$33. \dots \begin{pmatrix} 1 & 0 & 0 \\ 0 & \frac{13}{10} & 0 \\ 0 & 0 & 1 \end{pmatrix} \begin{pmatrix} 1 & -\frac{4}{5} & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix} \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & \frac{3}{2} & 1 \end{pmatrix} \dots$$

$$\dots \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -\frac{93}{52} \end{pmatrix} \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & \frac{31}{26} \\ 0 & 0 & 1 \end{pmatrix} \begin{pmatrix} 1 & 0 & \frac{28}{13} \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$$

$$35. \begin{pmatrix} 1 & 0 & 0 \\ \frac{4}{3} & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix} \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ -\frac{4}{3} & 0 & 1 \end{pmatrix} \dots$$

$$\dots \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & -2 & 1 \end{pmatrix} \begin{pmatrix} 3 & 0 & 3 \\ 0 & -1 & -1 \\ 0 & 0 & -1 \end{pmatrix}$$

$$39. \begin{pmatrix} 1 & 0 & 0 \\ \frac{5}{6} & 1 & 0 \\ -\frac{2}{3} & -\frac{16}{9} & 1 \end{pmatrix} \begin{pmatrix} -6 & 3 & -6 \\ 0 & -\frac{9}{2} & 4 \\ 0 & 0 & \frac{10}{9} \end{pmatrix}, x = \begin{pmatrix} -8 \\ \frac{53}{5} \\ \frac{69}{5} \end{pmatrix}.$$