

δ

$$A = \begin{bmatrix} 4 & -3 \\ 7 & 1 \end{bmatrix} \quad \delta A = ad - bc$$

$$(4)(1) - (-3)(7)$$

$$= 4 + 21 = 25$$

$$A^{-1} = \frac{1}{\delta} \begin{bmatrix} d & -b \\ -c & a \end{bmatrix} \quad A \cdot A^{-1} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

$$= \frac{1}{25} \begin{bmatrix} 1 & 3 \\ -7 & 4 \end{bmatrix}$$

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$$\begin{vmatrix} 5 & -2 \\ 6 & 1 \end{vmatrix} \quad \delta = 5(1) - (-2)(6) \quad \begin{vmatrix} a & b \\ c & d \end{vmatrix}$$

$$5 + 12 = 17$$

$$\begin{vmatrix} x & y \\ r & s \end{vmatrix} \quad \delta = x(s) - y(r)$$

$$\begin{bmatrix} 5 & -2 \\ 6 & 1 \end{bmatrix} \cdot \begin{bmatrix} 1 & 2 \\ -6 & 5 \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

$$\begin{matrix} 3x = 6 \\ x = 2 \end{matrix} \quad \frac{1}{17} \begin{bmatrix} 5(1) + (-2)(-6) & 5(2) + (-2)(5) \\ 6(1) + (1)(-6) & 6(2) + (1)(5) \end{bmatrix}$$

$$\delta = 5(1) - (-2)(6)$$

$$\delta = 17$$

$$A = \begin{bmatrix} -7 & 4 \\ -3 & 8 \end{bmatrix} \quad A^{-1} = \frac{1}{\delta} \begin{bmatrix} 8 & -4 \\ 3 & -7 \end{bmatrix}$$

$ad - bc$

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$$B = \begin{bmatrix} 4 & -3 \\ 7 & 1 \end{bmatrix}$$

$$B^{-1} = \frac{1}{4(1) - (-3)(7)} \begin{bmatrix} 1 & 3 \\ -7 & 4 \end{bmatrix} = \frac{1}{25} \begin{bmatrix} 1 & 3 \\ -7 & 4 \end{bmatrix} = \begin{bmatrix} \frac{1}{25} & \frac{3}{25} \\ -\frac{7}{25} & \frac{4}{25} \end{bmatrix}$$

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$$3x - 7y = -11$$

$$4x + 2y = 5$$

Coefficient
MatrixVariable
MatrixConstant
Matrix

$$\begin{bmatrix} 3 & -7 \\ 4 & 2 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} -11 \\ 5 \end{bmatrix}$$

$$3x = 6$$

$$\frac{1}{3} \cdot 3x = \frac{1}{3} \cdot 6$$

$$\begin{bmatrix} x \\ y \end{bmatrix} = \frac{1}{34} \begin{bmatrix} 2 & 7 \\ -4 & 3 \end{bmatrix} \begin{bmatrix} -11 \\ 5 \end{bmatrix}$$

$$x = 2$$

$$4x = 8$$

$$3x = 7$$

$$\begin{bmatrix} x \\ y \end{bmatrix} = \frac{1}{34} \begin{bmatrix} 2(-11) + 7(5) \\ -4(-11) + 3(5) \end{bmatrix} = \frac{1}{34} \begin{bmatrix} 13 \\ 59 \end{bmatrix}$$

$$\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} \frac{13}{34} \\ \frac{59}{34} \end{bmatrix}$$

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$$-5x + 7y = -4$$

$$3x - 8y = 13$$

$$\begin{bmatrix} -5 & +7 \\ +3 & -8 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} -4 \\ 13 \end{bmatrix}$$

$$\begin{bmatrix} x \\ y \end{bmatrix} = \frac{1}{19} \begin{bmatrix} -8 & -7 \\ -3 & -5 \end{bmatrix} \begin{bmatrix} -4 \\ 13 \end{bmatrix}$$

$$= \frac{1}{19} \begin{bmatrix} -8(-4) + (-7)(13) \\ -3(-4) + (-5)(13) \end{bmatrix} = \frac{1}{19} \begin{bmatrix} -59 \\ 59 \end{bmatrix}$$

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$$-11y + 17x = 14 \quad 17x - 11y = 14$$

$$-9y - 8x = 3 \quad -8x - 9y = 3$$

$$\begin{bmatrix} x \\ y \end{bmatrix} = \frac{1}{241} \begin{bmatrix} -9 & 17 \\ 8 & 11 \end{bmatrix} \begin{bmatrix} 14 \\ 3 \end{bmatrix}$$

$$\begin{aligned} & ad - bc \\ & 17(-9) - (-11)(8) \\ & -153 - 88 \end{aligned}$$

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$$[1(8)(6) + 2(7)(4) + 3(9)(5)] -$$

$$[2(9)(6) + 1(7)(5) + 3(8)(4)]$$

$$[48 + 56 + 135] - [108 + 35 + 96]$$

$$[239] - [239] = 0$$

Jan 7-11:27 AM

1. $2x - 3y = 6$
 $3x + y = -2$

2. $-5x + 3y = 12$
 $4x - y = 6$

3. $-7x + 2y = 14$
 $x + 3y = -4$

Find Δ

$$\begin{vmatrix} 4 & 2 & 1 \\ 0 & -3 & 2 \\ 5 & 1 & 6 \end{vmatrix}$$

$$\begin{vmatrix} 6 & 0 & -2 \\ 5 & 0 & 3 \\ 2 & 1 & 7 \end{vmatrix}$$

$$\begin{vmatrix} -2 & 0 & 5 \\ 0 & 1 & 6 \\ -3 & 5 & 4 \end{vmatrix}$$

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$$\begin{aligned}
 3x - 2y &= 4 \\
 -5x + y &= -6 \\
 \begin{bmatrix} 3 & -2 \\ -5 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} &= \begin{bmatrix} 4 \\ -6 \end{bmatrix} & 3(1) - (-2)(-5) \\
 & & 3 - 10 \\
 & & -7 \\
 \begin{bmatrix} x \\ y \end{bmatrix} &= \frac{1}{-7} \begin{bmatrix} 1 & 2 \\ 5 & 3 \end{bmatrix} \begin{bmatrix} 4 \\ -6 \end{bmatrix} \\
 \begin{bmatrix} x \\ y \end{bmatrix} &= \frac{1}{-7} \begin{bmatrix} 1(4) + 2(-6) \\ 5(4) + 3(-6) \end{bmatrix} \\
 &= \frac{1}{-7} \begin{bmatrix} -8 \\ 2 \end{bmatrix} = \begin{bmatrix} 8/7 \\ 2/7 \end{bmatrix}
 \end{aligned}$$

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$$\begin{aligned}
 B &= \begin{bmatrix} 9 & 0 & 6 \\ 4 & 2 & 8 \\ -5 & 1 & 2 \end{bmatrix} \quad \text{SB} \\
 &\begin{array}{ccc} 9 & 0 & 6 \\ 4 & 2 & 8 \\ -5 & 1 & 2 \end{array} \begin{array}{ccc} 9 & 0 & 6 \\ 4 & 2 & 8 \\ -5 & 1 & 2 \end{array} \\
 &\{ 9(2)(2) + (0)(5)(-5) + 6(4)(1) \} - \\
 &\{ 0(4)(2) + 9(8)(1) + 6(2)(-5) \} \\
 &\quad (36 + 0 + 24) - (0 + 72 - 60) \\
 &\quad 60 - 12 \\
 &\quad 48 \\
 &\begin{bmatrix} 9 & 0 & 6 \\ 4 & 2 & 8 \\ -5 & 1 & 2 \end{bmatrix} \quad \text{Expansion By Minors} \\
 &+(-5) \begin{vmatrix} 0 & 6 \\ 2 & 8 \end{vmatrix} - 1 \begin{vmatrix} 9 & 6 \\ 4 & 2 \end{vmatrix} + 2 \begin{vmatrix} 9 & 0 \\ 4 & 2 \end{vmatrix} \\
 &+(-5)(-12) - 1(48) + 2(18) \\
 &\quad +60 - 48 + 36 = 48 \\
 &\begin{bmatrix} 9 & 0 & 6 \\ 4 & 2 & 8 \\ -5 & 1 & 2 \end{bmatrix} \\
 &+ (9) \begin{vmatrix} 2 & 8 \\ 1 & 2 \end{vmatrix} - (4) \begin{vmatrix} 0 & 6 \\ 1 & 2 \end{vmatrix} + (-5) \begin{vmatrix} 0 & 6 \\ 2 & 8 \end{vmatrix} \\
 &\quad 9(-4) - 4(-6) - 5(-12) \\
 &\quad -36 + 24 + 60 \\
 &\quad 48
 \end{aligned}$$

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$$\begin{bmatrix} 6 & 4 & 3 \\ -2 & 0 & 2 \\ 5 & 0 & 1 \end{bmatrix} \quad -(4) \begin{vmatrix} -2 & 2 \\ 5 & 1 \end{vmatrix}$$

$$-4(-2-10)$$

$$-4(-12) = 48$$

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$$\begin{vmatrix} 4 & 2 & -1 \\ 6 & 5 & 4 \\ -7 & 3 & -3 \end{vmatrix} \quad \text{Zeros}$$

$$\begin{vmatrix} 0 & 0 & -1 \\ 22 & 13 & 4 \\ -19 & -3 & -3 \end{vmatrix}$$

Diagram showing expansion of the first determinant along the first row. A red arrow points from the element -1 to the minor determinant. A blue arrow points from the element 4 to its minor determinant. A blue arrow points from the element 2 to its minor determinant. The minor for -1 is $\begin{vmatrix} 6 & 5 \\ -7 & 3 \end{vmatrix}$. The minor for 4 is $\begin{vmatrix} 4 & 2 \\ 3 & -3 \end{vmatrix}$. The minor for 2 is $\begin{vmatrix} 6 & 4 \\ -7 & -3 \end{vmatrix}$.

$$+(-1) \begin{vmatrix} 22 & 13 \\ -19 & -3 \end{vmatrix} = -1(-66 + 247)$$

$$= -1(181)$$

$$= -181$$

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$$\begin{bmatrix} 5 & 3 & 12 \\ -4 & 6 & -6 \\ -2 & -9 & 1 \end{bmatrix}$$

$$\begin{array}{r|rrr} 29 & 111 & 12 \\ -16 & -48 & -6 \\ \hline 0 & 0 & 1 \end{array}$$

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$$\begin{bmatrix} -8 & 5 & 7 \\ 6 & -2 & 11 \\ 11 & 9 & -2 \end{bmatrix} \quad \begin{matrix} \leftarrow \\ \times 2 \end{matrix}$$

$$\begin{vmatrix} 4 & 1 & 29 \\ 6 & -2 & 11 \\ 11 & 9 & -2 \end{vmatrix} \begin{matrix} \times 2 \\ \times -9 \end{matrix}$$

Jan 10-12:00 PM

$$\begin{vmatrix} 8 & -3 & 5 \\ 3 & 7 & 11 \\ -5 & 17 & 23 \end{vmatrix} \begin{vmatrix} 8 & -3 \\ 3 & 7 \\ -5 & 17 \end{vmatrix}$$

a) Diagonal

$$[(8)(7)(23) + (-3)(11)(-5) + 5(3)(17)] - [(-5)(3)(23) + (8)(11)(17) + 5(7)(-5)]$$

b) Expansion By Minors

$$+ (8) \begin{vmatrix} 7 & 11 \\ 17 & 23 \end{vmatrix} - (-3) \begin{vmatrix} -5 & 23 \\ -5 & 17 \end{vmatrix} + (-5) \begin{vmatrix} -5 & 17 \\ 3 & 11 \end{vmatrix}$$

$$8(161 - 187) - 3(-69 - 85) - 5(-33 - 35)$$

c) 3x3

$$\begin{vmatrix} 8 & -3 & 5 \\ 3 & 7 & 11 \\ -5 & 17 & 23 \end{vmatrix} \begin{vmatrix} 8 & -3 & -27 \\ 3 & 7 & -1 \\ -5 & 17 & 43 \end{vmatrix}$$

$$\begin{vmatrix} 8 & -3 & 5 \\ -13 & 13 & 1 \\ -5 & 17 & 23 \end{vmatrix} \begin{vmatrix} 8 & -3 & 5 \\ 19 & 1 & 21 \\ -5 & 11 & 23 \end{vmatrix}$$

$$\begin{vmatrix} 73 & -68 & 5 \\ 0 & 0 & 1 \\ 294 & 316 & 23 \end{vmatrix} \begin{vmatrix} 73 & -68 \\ 294 & 316 \end{vmatrix}$$

$$-1(73(316) - (-68)(294))$$

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$x + y - z = 12$ Cramer's Rule:

$$\begin{cases} 2x - 3y + z = -4 \\ -3x + 2y - 2z = 10 \end{cases}$$

D

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

D_x

$$\begin{vmatrix} 12 & 1 & -1 \\ -4 & -3 & 1 \\ 10 & 2 & -2 \end{vmatrix}$$

D_y

$$\begin{vmatrix} 1 & 12 & -1 \\ 2 & -4 & 1 \\ -3 & 10 & -2 \end{vmatrix}$$

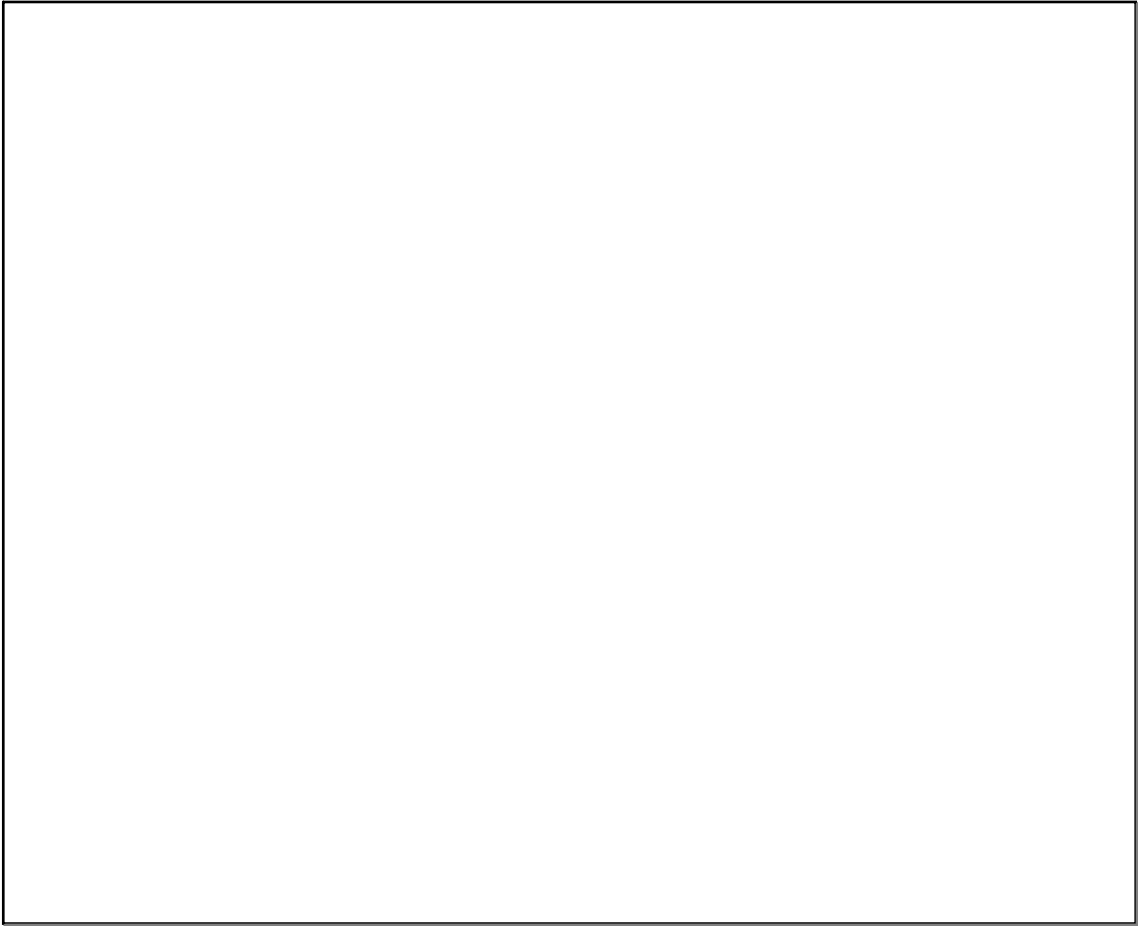
D_z

$$\begin{vmatrix} 1 & 1 & 12 \\ 2 & -3 & -4 \\ -3 & 2 & 10 \end{vmatrix}$$

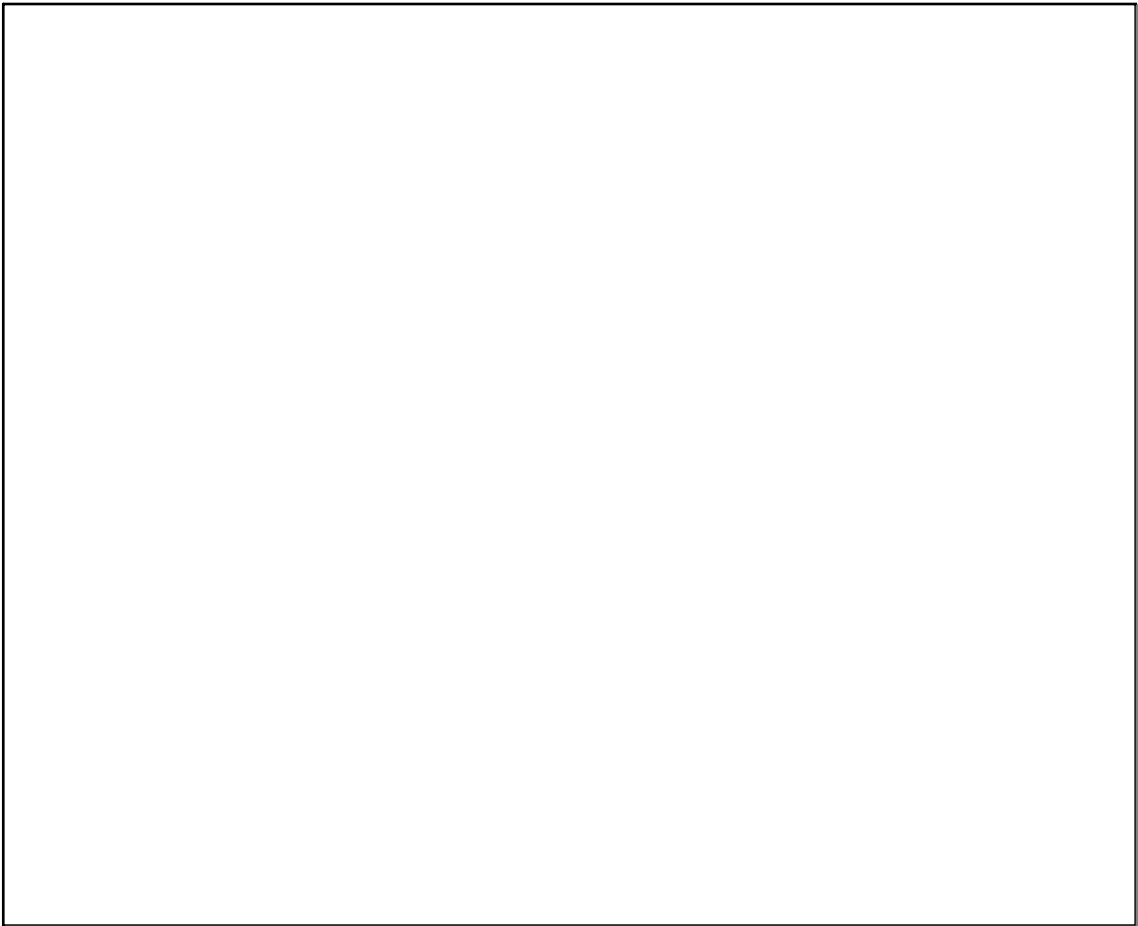
$D = 10$ $D_y = 2$ $x = \frac{D_x}{D} = \frac{28}{10}$

$D_x = 28$ $D_z = -90$ $y = \frac{D_y}{D} = \frac{2}{10}$

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