

392: 1-3

1. $(3, 2)$

2. $(-\frac{55}{11}, \frac{44}{11})$

3. $(-1, 6)$

$(-5, 4)$

392: 1-3 by hand

$$1. \begin{cases} 5x - 2y = 11 \\ -4x + 7y = 2 \end{cases} \quad A = \begin{bmatrix} 5 & -2 \\ -4 & 7 \end{bmatrix} \quad B = \begin{bmatrix} 11 \\ 2 \end{bmatrix} \quad X = \begin{bmatrix} x \\ y \end{bmatrix}$$

$$AX = B \quad X = A^{-1}B$$

$$\det(A) = 35 - 8 = 27$$

$$A^{-1} = \frac{1}{27} \begin{bmatrix} 7 & -2 \\ -4 & 5 \end{bmatrix} = \begin{bmatrix} \frac{7}{27} & -\frac{2}{27} \\ +\frac{4}{27} & \frac{5}{27} \end{bmatrix}$$

$$A^{-1}B = \begin{bmatrix} \frac{7}{27} & -\frac{2}{27} \\ \frac{4}{27} & \frac{5}{27} \end{bmatrix} \begin{bmatrix} 11 \\ 2 \end{bmatrix} = \begin{bmatrix} \frac{77}{27} + \frac{4}{27} \\ \frac{44}{27} + \frac{10}{27} \end{bmatrix} = \begin{bmatrix} \frac{81}{27} \\ \frac{54}{27} \end{bmatrix} = \begin{bmatrix} 3 \\ 2 \end{bmatrix} \quad \boxed{(3, 2)}$$

$$2. \begin{cases} 2x + 3y = 2 \\ x - 4y = -21 \end{cases} \quad A = \begin{bmatrix} 2 & 3 \\ 1 & -4 \end{bmatrix} \quad B = \begin{bmatrix} 2 \\ -21 \end{bmatrix} \quad X = \begin{bmatrix} x \\ y \end{bmatrix}$$

$$AX = B \quad X = A^{-1}B$$

$$\det(A) = -8 - 3 = -11$$

$$A^{-1} = -\frac{1}{11} \begin{bmatrix} -4 & -3 \\ -1 & 2 \end{bmatrix} = \begin{bmatrix} \frac{4}{11} & \frac{3}{11} \\ \frac{1}{11} & -\frac{2}{11} \end{bmatrix}$$

$$A^{-1}B = \begin{bmatrix} \frac{4}{11} & \frac{3}{11} \\ \frac{1}{11} & -\frac{2}{11} \end{bmatrix} \begin{bmatrix} 2 \\ -21 \end{bmatrix} = \begin{bmatrix} \left(\frac{12}{11} - \frac{63}{11}\right) \\ \left(\frac{2}{11} - \frac{42}{11}\right) \end{bmatrix} = \begin{bmatrix} \frac{-51}{11} \\ \frac{45}{11} \end{bmatrix}$$

$$\left(-\frac{51}{11}, \frac{45}{11} \right)$$

$$3) \begin{cases} -3x + 5y = 33 \\ 2x - 4y = -26 \end{cases}$$

$$\cancel{A^{-1}A}X = A^{-1}B$$

$$A X = B \\ A = \begin{bmatrix} -3 & 5 \\ 2 & -4 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 33 \\ -26 \end{bmatrix}$$

$$\det(A) = 12 - 10 = 2$$

$$A^{-1} = \frac{1}{2} \begin{bmatrix} -4 & -5 \\ -2 & -3 \end{bmatrix} = \begin{bmatrix} -\frac{4}{2} & -\frac{5}{2} \\ -\frac{2}{2} & -\frac{3}{2} \end{bmatrix}$$

$$A^{-1}B = \begin{bmatrix} -\frac{4}{2} & -\frac{5}{2} \\ -\frac{2}{2} & -\frac{3}{2} \end{bmatrix} \begin{bmatrix} 33 \\ -26 \end{bmatrix} = \begin{bmatrix} \left(-\frac{132}{2} + \frac{130}{2}\right) \\ \left(\frac{66}{2} + \frac{78}{2}\right) \end{bmatrix} = \begin{bmatrix} -\frac{2}{2} \\ \frac{12}{2} \end{bmatrix}$$

$$= \begin{bmatrix} -1 \\ 6 \end{bmatrix} \quad \boxed{(-1, 6)}$$