

Non-Calculator portion

1) Find $2A - 3B$.

$$A = \begin{bmatrix} -3 & -4 & 9 \\ 5 & -1 & -8 \end{bmatrix} \quad B = \begin{bmatrix} -5 & 4 & -2 \\ 7 & -3 & 6 \end{bmatrix}$$

$$\begin{bmatrix} -6 & -8 & 18 \\ 10 & -2 & -16 \end{bmatrix} - \begin{bmatrix} -15 & 12 & -6 \\ 21 & -9 & 18 \end{bmatrix}$$

$$\begin{bmatrix} 9 & -20 & 24 \\ -11 & 7 & -34 \end{bmatrix}$$

2) Solve for x and y.

$$5 \begin{bmatrix} -7 & 6 \\ 2 & x \end{bmatrix} - 3 \begin{bmatrix} 3 & y \\ 0 & -5 \end{bmatrix} = \begin{bmatrix} -44 & 9 \\ 10 & -5 \end{bmatrix}$$

$$5x - 3(-5) = -5$$

$$5x + 15 = -5$$

$$5x = -20$$

$$x = -4$$

$$5(6) - 3y = 9$$

$$30 - 3y = 9$$

$$-3y = -21$$

$$y = 7$$

3) Find AB .

$$A = \begin{bmatrix} -1 & -4 & 3 \\ -2 & -1 & 4 \end{bmatrix}_{2 \times 3} \quad B = \begin{bmatrix} -4 & 1 \\ 4 & -3 \\ 2 & -2 \end{bmatrix}_{3 \times 2}$$

$$\begin{bmatrix} 4 + 16 + 6 & -1 + 12 + 6 \\ 8 + 4 + 8 & -2 + 3 + 8 \end{bmatrix} = \begin{bmatrix} 26 & 19 \\ 20 & 9 \end{bmatrix}$$

4) Evaluate $\begin{vmatrix} -4 & -6 \\ 7 & 2 \end{vmatrix}$

$$-8 - 42 = -50$$

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

$$(-75 + 2 + 8) - (-3 + 20 + 20)$$

$$-85 - 43$$

$$= -128$$

6) Use an inverse matrix to solve:

$$\begin{cases} 3x - 2y = -8 \\ 5x + 4y = -6 \end{cases}$$

$$\begin{bmatrix} 3 & -2 \\ 5 & 4 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} -8 \\ -6 \end{bmatrix}$$

$$A^{-1} = \frac{1}{12 - 10} \begin{bmatrix} 4 & 2 \\ -5 & 3 \end{bmatrix} = \frac{1}{2} \begin{bmatrix} 4 & 2 \\ -5 & 3 \end{bmatrix}$$

$$A^{-1} = \begin{bmatrix} 2 & 1 \\ -5/2 & 3/2 \end{bmatrix} \begin{bmatrix} -8 \\ -6 \end{bmatrix}$$

$$\begin{bmatrix} -16 & -6 \\ 20 & -9 \end{bmatrix} \begin{bmatrix} 1/2 \\ 1/2 \end{bmatrix} = \begin{bmatrix} -12 \\ 11 \end{bmatrix}$$

$$\begin{bmatrix} -2 \\ 1 \end{bmatrix}$$

$$[A^{-1}] \times [B] \rightarrow A = \begin{bmatrix} .03 & .02 \\ 1 & 1 \end{bmatrix} \quad B = \begin{bmatrix} 520 \\ 20,000 \end{bmatrix}$$

Calculator portion

7) Mr. Sullivan had \$20,000 to invest. He invested part at 3% and the rest at 2%. After one year he earned \$520.

How much did he invest at each rate?

$$\begin{aligned} .03X + .02Y &= 520 \\ X + Y &= 20,000 \end{aligned}$$

\$12,000 AT 3%
\$8,000 AT 2%

8) Use an inverse matrix to solve the system.

$$\begin{cases} x + 2y - z = 3 \\ 3x - 3y + z = -14 \\ 2x - 4y + 3z = -13 \end{cases}$$

$$[A^{-1}] \times [B] = X$$

$$A = \begin{bmatrix} 1 & 2 & -1 \\ 3 & -3 & 1 \\ 2 & -4 & 3 \end{bmatrix} \quad B = \begin{bmatrix} 3 \\ -14 \\ -13 \end{bmatrix}$$

$$(-2, 3, 1)$$

9) Use Cramer's Rule to solve the system.

$$\begin{cases} 2x - y + z = -7 \\ x + 3y - 2z = 11 \\ x - 3y + 2z = -13 \end{cases}$$

$$x_2 = \frac{\begin{vmatrix} -7 & -1 & 1 & -7 & -1 \\ 11 & 3 & -2 & 11 & 3 \\ -13 & -3 & 2 & -13 & -3 \end{vmatrix}}{-2} = \frac{2}{-2} \rightarrow \boxed{X = -1}$$

$$y = \frac{-4}{-2} \rightarrow \boxed{Y = 2}$$

$$z = \frac{14}{-2} = -7 \rightarrow \boxed{Z = -7}$$

10) Find the determinate of the coefficient matrix from #9.

$$\det [A] = \begin{vmatrix} 2 & -1 & 1 \\ 1 & 3 & -2 \\ 1 & -3 & 2 \end{vmatrix} = \boxed{-2}$$