

These are intended as by-hand calculations. The arithmetic shouldn't be too hard.

1 Use Cramer's Rule to compute $\begin{bmatrix} 3 & -8 \\ 4 & 11 \end{bmatrix}^{-1}$

2 Use Gauss-Jordan Elimination to compute $\begin{bmatrix} 1 & 2 & 3 \\ 2 & 3 & 4 \\ 3 & 4 & 6 \end{bmatrix}^{-1}$ (if possible).

3 Use Gauss-Jordan Elimination to compute $\begin{bmatrix} 1 & 2 & 3 \\ 2 & 3 & 4 \\ 0 & 1 & 2 \end{bmatrix}^{-1}$ (if possible).

4 Consider the system

$$\begin{aligned} \mathbf{x}' &= 3\mathbf{x} + 4\mathbf{y} \\ \mathbf{y}' &= 4\mathbf{x} - 3\mathbf{y} \end{aligned}$$

As in the last problem on Test #2, make a *labeled* direction-field plot for this system showing:

- the locus where $\mathbf{x}' = \mathbf{0}$ and the field direction at points thereon
- the locus where $\mathbf{y}' = \mathbf{0}$ and the field direction at points thereon
- solutions which lie on straight lines through the origin
- some representative direction arrows at points in all the regions not falling into one of the above two categories.

Make a guess as to where solutions which lie on straight lines through the origin might lie.

5 Repeat problem 4 for the system

$$\begin{aligned} \mathbf{x}' &= 3\mathbf{x} + 4\mathbf{y} \\ \mathbf{y}' &= -4\mathbf{x} + 3\mathbf{y} \end{aligned}$$