

Problem 17

In each of Problems 10 through 19, either compute the inverse of the given matrix, or else show that it is singular.

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

Solution

Start by calculating the determinant.

$$\begin{aligned} \det \begin{pmatrix} 2 & 3 & 1 \\ -1 & 2 & 1 \\ 4 & -1 & -1 \end{pmatrix} &= 2 \begin{vmatrix} 2 & 1 \\ -1 & -1 \end{vmatrix} - 3 \begin{vmatrix} -1 & 1 \\ 4 & -1 \end{vmatrix} + 1 \begin{vmatrix} -1 & 2 \\ 4 & -1 \end{vmatrix} \\ &= 2(-2 + 1) - 3(1 - 4) + 1(1 - 8) \\ &= 0 \end{aligned}$$

Since it's zero, an inverse for the given matrix does not exist.