

Problem 14

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

$$\begin{pmatrix} 1 & 2 & 1 \\ -2 & 1 & 8 \\ 1 & -2 & -7 \end{pmatrix}$$

Solution

Start by calculating the determinant.

$$\begin{aligned} \det \begin{pmatrix} 1 & 2 & 1 \\ -2 & 1 & 8 \\ 1 & -2 & -7 \end{pmatrix} &= 1 \begin{vmatrix} 1 & 8 \\ -2 & -7 \end{vmatrix} - 2 \begin{vmatrix} -2 & 8 \\ 1 & -7 \end{vmatrix} + 1 \begin{vmatrix} -2 & 1 \\ 1 & -2 \end{vmatrix} \\ &= 1(-7 + 16) - 2(14 - 8) + 1(4 - 1) \\ &= 0 \end{aligned}$$

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