

Instructions: Show all work. Use exact answers unless specifically asked to round.

1. Use the cofactor method to find the determinant of the following matrix.

$$\begin{vmatrix} 9 & 4 & 3 & 5 \\ 9 & 7 & 9 & 0 \\ 8 & 3 & 1 & 9 \\ 1 & 4 & 6 & 6 \end{vmatrix}$$

$$-5 \begin{vmatrix} 9 & 7 & 9 \\ 8 & 3 & 1 \\ 1 & 4 & 6 \end{vmatrix} - 9 \begin{vmatrix} 9 & 4 & 3 \\ 9 & 7 & 9 \\ 1 & 4 & 6 \end{vmatrix} + 6 \begin{vmatrix} 9 & 4 & 3 \\ 9 & 7 & 9 \\ 8 & 3 & 1 \end{vmatrix} =$$

$$-5 \left[9 \begin{vmatrix} 3 & 1 \\ 4 & 6 \end{vmatrix} - 7 \begin{vmatrix} 8 & 1 \\ 1 & 6 \end{vmatrix} + 9 \begin{vmatrix} 8 & 3 \\ 1 & 4 \end{vmatrix} \right] - 9 \left[9 \begin{vmatrix} 7 & 9 \\ 4 & 6 \end{vmatrix} - 4 \begin{vmatrix} 9 & 9 \\ 1 & 6 \end{vmatrix} + 3 \begin{vmatrix} 9 & 7 \\ 8 & 3 \end{vmatrix} \right] +$$

$$6 \left[9 \begin{vmatrix} 7 & 9 \\ 8 & 1 \end{vmatrix} - 4 \begin{vmatrix} 9 & 9 \\ 8 & 1 \end{vmatrix} + 3 \begin{vmatrix} 9 & 7 \\ 8 & 3 \end{vmatrix} \right] =$$

$$-5 \left[9(18-4) - 7(48-1) + 9(32-3) \right] - 9 \left[9(42-36) - 4(54-9) + 3(36-7) \right]$$

$$+ 6 \left[9(7-27) - 4(9-72) + 3(27-56) \right] =$$

$$-5 \left[126 - 329 + 261 \right] - 9 \left[54 - 180 + 87 \right] + 6 \left[-180 + 252 - 87 \right]$$

$$-5 \left[58 \right] - 9 \left[-39 \right] + 6 \left[-15 \right] = -29$$

2. Explain in your own words why a matrix whose determinant is zero does not have an inverse.

answers will vary, but a matrix w/ a zero-determinant is not row equivalent to the identity matrix. To be invertible it must be row equivalent to the identity.