

1 of 6 ▼



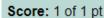


Let 
$$A = \begin{bmatrix} 4 & 3 \\ -1 & 2 \end{bmatrix}$$
 and  $B = \begin{bmatrix} 2 & 6 \\ -2 & k \end{bmatrix}$ . What value(s) of k, if any, will make  $AB = BA$ ?

Select the correct choice below and, if necessary, fill in the answer box within your choice.



B. No value of k will make AB = BA









2.1.12

Let 
$$A = \begin{bmatrix} 4 & -8 \\ -5 & 10 \end{bmatrix}$$
. Construct a 2 × 2 matrix B such that AB is the zero matrix. Use two different nonzero columns for B.

$$B = \begin{bmatrix} 2 & 4 \\ 1 & 2 \end{bmatrix}$$

## Score: 1 of 1 pt





2.2.4

Find the inverse of the matrix.

Select the correct choice below and, if necessary, fill in the answer boxes to complete your choice.

A. 
$$\begin{bmatrix} 5 & 8 \\ -3 & -5 \end{bmatrix}^{-1} = \begin{bmatrix} 5 & 8 \\ -3 & -5 \end{bmatrix}$$
 (Simplify your answers.)

B. The matrix is not invertible.

Use the algorithm for finding  $A^{-1}$  to find the inverses of the matrices shown to the right. Let A be the corresponding  $n \times n$  matrix, and let B be its inverse. Guess the form of B, and then show that AB = I.

$$\begin{bmatrix} 1 & 0 & 0 \\ 2 & 2 & 0 \\ 3 & 3 & 3 \end{bmatrix}^{-1} = \begin{bmatrix} 1 & 0 & 0 \\ -1 & \frac{1}{2} & 0 \\ 0 & -\frac{1}{2} & \frac{1}{3} \end{bmatrix}$$

$$\begin{bmatrix} 1 & 0 & 0 & 0 \\ 2 & 2 & 0 & 0 \\ 3 & 3 & 3 & 0 \\ 4 & 4 & 4 & 4 \end{bmatrix}^{-1} = \begin{bmatrix} 1 & 0 & 0 & 0 \\ -1 & \frac{1}{2} & 0 & 0 \\ 0 & -\frac{1}{2} & \frac{1}{3} & 0 \\ 0 & 0 & -\frac{1}{3} & \frac{1}{4} \end{bmatrix}$$

If A is the corresponding n×n matrix and B is its inverse, which of the following is B?

B. 
$$\begin{bmatrix} 1 & 0 & 0 & \cdots & 0 & 0 \\ -1 & \frac{1}{2} & 0 & & 0 & 0 \\ 0 & -\frac{1}{2} & \frac{1}{3} & & & 0 & 0 \\ \vdots & & \ddots & & \vdots \\ 0 & 0 & 0 & \cdots & -\frac{1}{n-1} & \frac{1}{n} \end{bmatrix}$$

For j = 1, 2, ..., n, let  $a_i$ ,  $b_i$ , and  $e_i$  denote the jth columns of A, B, and I, respectively. First let j = 1, 2, ..., n - 1 and evaluate  $Ab_i$ .

$$Ab_{j} = A\left[\frac{1}{j}\left(e_{j} - e_{j+1}\right)\right]$$

Distribute to remove the brackets.

$$Ab_{j} = \frac{1}{i} \left( a_{j} - a_{j+1} \right)$$

Rewrite a<sub>i</sub> and a<sub>i+1</sub> in terms of the columns of I.

$$\mathsf{Ab}_j = \frac{1}{j} \left( \left[ j \mathsf{e}_j + (j+1) \mathsf{e}_{j+1} + \dots + n \mathsf{e}_n \right] - \left[ (j+1) \mathsf{e}_{j+1} + \dots + n \mathsf{e}_n \right] \right)$$

Simplify this expression.

$$Ab_j = \frac{1}{i} (je_j)$$

Because the result from the previous step is equal to  $e_j$ , it follows that AB = I for j = 1,2,...,n - 1.

Which of the following shows that AB = I for j = n, completing the proof?

$$Ab_n = A \left( \frac{1}{n-1} e_{n-1} \right)$$

$$= \frac{1}{n-1} a_{n-1}$$

$$= e_n$$

Ab<sub>n</sub> = A
$$\left(\frac{1}{n}e_n\right)$$
  
=  $\frac{1}{n}a_n$   
=  $e_n$ 

Oc. 
$$Ab_n = A\left(\frac{1}{n+1}e_{n+1}\right)$$
$$= \frac{1}{n+1}a_{n+1}$$
$$= e_n$$

$$\bigcirc D. \quad Ab_n = A(ne_n)$$
$$= e_n$$



Determine if the matrix below is invertible. Use as few calculations as possible. Justify your answer.

Choose the correct answer below.

- A. The matrix is invertible because its determinant is not zero.
- O B. The matrix is invertible because its columns are multiples of each other. The columns of the matrix form a linearly dependent set.
- O. The matrix is not invertible because its determinant is zero.
- O. The matrix is not invertible because the matrix has 2 pivot positions.



Determine if the matrix below is invertible. Use as few calculations as possible. Justify your answer.

Determine if the matrix below is invertible. Use as few calculations as possible. Justify your answer.

- A. The matrix is not invertible. In the given matrix the columns do not form a linearly independent set.
- B. The matrix is invertible. The given matrix is not row equivalent to the n×n identity matrix.
- $\bigcirc$  C. The matrix is not invertible. If the given matrix is A, the equation Ax = b has no solution for at least one b in  $\mathbb{R}^3$ .
- The matrix is invertible. The given matrix has 3 pivot positions.