1-4

September 3, 2025

Verify that the matricies and scalars satisfy the stated properties.

$$A = \begin{bmatrix} 3 & -1 \\ 2 & 4 \end{bmatrix} \quad B = \begin{bmatrix} 0 & 2 \\ 1 & -4 \end{bmatrix} C = \begin{bmatrix} 4 & 1 \\ -3 & -2 \end{bmatrix} \quad a = 4 \quad b = -7$$

3

$(a)(A^T)^T = A(b)(AB)^T = B^T A^T$

4

$(a)(A + B)^T = A^T + B^T(b)(aC)^T = aC^T$

Compute the inverse of the matrix.

5

$$A = \begin{bmatrix} 2 & -3 \\ 4 & 4 \end{bmatrix}$$

7

$$C = \begin{bmatrix} 2 & 0 \\ 0 & 3 \end{bmatrix}$$

9

$$\begin{bmatrix} \frac{1}{2}(e^x + e^{-x}) & \frac{1}{2}(e^x - e^{-x}) \\ \frac{1}{2}(e^x - e^{-x}) & \frac{1}{2}(e^x + e^{-x}) \end{bmatrix}$$

Verify that the equation is valid for

$$A = \begin{bmatrix} 2 & -3 \\ 4 & 4 \end{bmatrix}$$

$$B = \begin{bmatrix} 3 & 1 \\ 5 & 2 \end{bmatrix}$$

$$C = \begin{bmatrix} 2 & 0 \\ 0 & 3 \end{bmatrix}$$

$$D = \begin{bmatrix} 6 & 4 \\ -2 & -1 \end{bmatrix}$$

13

$$(ABC)^{-1} = C^{-1}B^{-1}A^{-1}$$

Find A.

15

$$(7A)^{-1} = \begin{bmatrix} -3 & 7 \\ 1 & -2 \end{bmatrix}$$

Compute the given equation using A.

19 a)

$$A = \begin{bmatrix} 3 & 1 \\ 2 & 1 \end{bmatrix}$$

$A^3 =?$

b)

A^{-3}

Compute $p(A)$ for the given functions:

$a)$ $p(x) = x - 2$

$b)$ $p(x) = 2x2 - x + 1$

$c)$ $p(x) = x3 - 2x + 1$

21

$$A = \begin{bmatrix} 3 & 1 \\ 2 & 1 \end{bmatrix}$$

Show that if a square matrix A satisfies the equation $A^2 + 2A + I = 0$, then A must be invertible. What is the inverse?

33 a)

In Exercises 37–38 determine whether A is invertible and if so find the inverse. [Hint: Solve AX = I for X by equating corresponding entries on the two sides.]

39

$(AB)^{-1}(AC^{-1})(D^{-1}C^{-1})^{-1}D^{-1}$

43 a) Show that if A is invertible and AB = AC, then B = C.