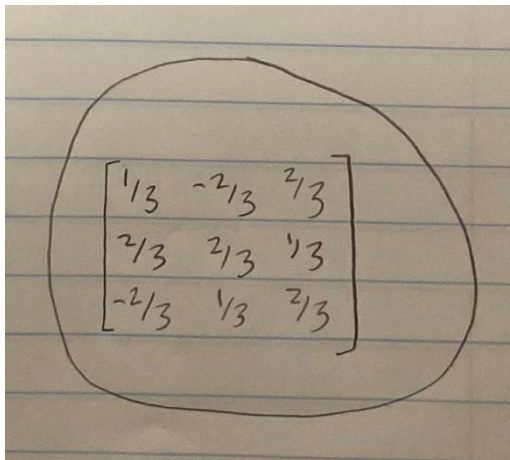


1

To find the inverse I put an identity matrix next to the matrix and used row operations to move the identity matrix to the left. The result is my answer. I included handwritten matrices in this problem since I was told I was allowed to on piazza.

Answer:



$$\begin{bmatrix} 1/3 & -2/3 & 2/3 \\ 2/3 & 2/3 & 1/3 \\ -2/3 & 1/3 & 2/3 \end{bmatrix}$$

$$\begin{bmatrix} 1/3 & 2/3 & -2/3 & 1 & 0 & 0 \\ -2/3 & 2/3 & 1/3 & 0 & 1 & 0 \\ 2/3 & 1/3 & 2/3 & 0 & 0 & 1 \end{bmatrix}$$

$$\begin{array}{l} R_2 = R_2 + R_3 \\ R_3 = R_3 - 2R_1 \end{array} \begin{bmatrix} 1/3 & 2/3 & -2/3 & 1 & 0 & 0 \\ 0 & 1 & 1 & 0 & 1 & 1 \\ 0 & -1 & 2 & -2 & 0 & 1 \end{bmatrix}$$

$$\begin{array}{l} R_3 = R_3 + R_2 \end{array} \begin{bmatrix} 1/3 & 2/3 & -2/3 & 1 & 0 & 0 \\ 0 & 1 & 1 & 0 & 1 & 1 \\ 0 & 0 & 3 & -2 & 1 & 2 \end{bmatrix}$$

$$\begin{array}{l} R_1 = R_1 - \frac{2}{3}R_2 \\ R_3 = R_3 \cdot \frac{1}{3} \end{array} \begin{bmatrix} 1/3 & 0 & -4/3 & 1 & -2/3 & -2/3 \\ 0 & 1 & 1 & 0 & 1 & 1 \\ 0 & 0 & 1 & -2/3 & 1/3 & 2/3 \end{bmatrix}$$

$$\begin{array}{l} R_1 = R_1 \cdot 3 \\ R_2 = R_2 - R_3 \end{array} \begin{bmatrix} 1 & 0 & -1/3 & 3 & -2 & -2 \\ 0 & 1 & 0 & 2/3 & 2/3 & 1/3 \\ 0 & 0 & 1 & -2/3 & 1/3 & 2/3 \end{bmatrix}$$

$$R_1 = R_1 + 4R_3 \begin{bmatrix} 1 & 0 & 0 & 1/3 & -2/3 & 2/3 \\ 0 & 1 & 0 & 2/3 & 2/3 & 1/3 \\ 0 & 0 & 1 & -2/3 & 1/3 & 2/3 \end{bmatrix}$$

$$\theta = \cos^{-1} \frac{v \cdot w}{||v|| ||w||}$$

$$u \cdot v = 3 * 4 - 3 * 3 - 1 * 3 = 0$$

$$||v|| = \sqrt{3^2 + 3^2 + -1^2} = \sqrt{19}$$

$$||w|| = \sqrt{4^2 + -3^2 + 3^2} = \sqrt{34}$$

$$\theta = \cos^{-1} \frac{0}{\sqrt{19}\sqrt{34}} = \frac{\pi}{2}$$