CSCI3302 HW0

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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:

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

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

$R_2 = R_2 + R_3$

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

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

$R_1 = R_1 + -\frac{2}{3}R_2$

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

$R_1 = R_1 \cdot 3$

$R_2 = R_2 - R_3$
$$\begin{bmatrix} 1 & 0 & -12/3 & 3 & -2 & -2 \\ 0 & 1 & 0 & 2/3 & 2/3 & 1/3 \\ 0 & 0 & 1 & -2/3 & \frac{1}{3} & \frac{2}{3} \end{bmatrix}$$

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

2

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

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

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

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

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