

Math 4133 - Linear Algebra

Quiz #11 - 2016.02.10 Solutions

For this quiz, consider the following matrices:

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

1. Compute A^T

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

2. Compute $\det(A^T \cdot B)$

$$\begin{aligned} \det(A^T \cdot B) &= \det(A^T) \cdot \det(B) \\ &= \det(A) \cdot \det(B) \\ &= (-6) \cdot (-6) \\ &= 36 \end{aligned}$$

3. Compute $\det(C^{-1})$

$$\begin{aligned} \det(C^{-1}) &= \frac{1}{\det(C)} \\ &= \frac{1}{(-2) \cdot (4) \cdot (3)} \\ &= -\frac{1}{24} \end{aligned}$$

4. Compute $\det(C^{-1} \cdot A^T \cdot B)$

$$\begin{aligned} \det(C^{-1} A^T \cdot B) &= \det(C^{-1}) \cdot \det(A^T) \cdot \det(B) \\ &= -\frac{1}{24} \cdot 36 \\ &= -\frac{3}{2} \end{aligned}$$