姓名: SOLUTION　　葉均承　　應數一線性代數

學號: _____　　**Quiz 6**　　考試日期: 2025/04/02

1. 請框出答案. 2. 不可使用手機、計算器，禁止作弊!

1. Find an orthogonal diagonalization of the matrix

$$\begin{bmatrix} 1 & -1 & -1 \\ -1 & 1 & -1 \\ -1 & -1 & 1 \end{bmatrix}$$

that is, find an orthogonal matrix C such that $C^{-1}AC$ is a diagonal matrix D.

Answer: $C = \underline{\begin{bmatrix} \frac{1}{\sqrt{3}} & \frac{-1}{\sqrt{2}} & \frac{-1}{\sqrt{6}} \\ \frac{1}{\sqrt{3}} & \frac{1}{\sqrt{2}} & \frac{-1}{\sqrt{6}} \\ \frac{1}{\sqrt{3}} & 0 & \frac{2}{\sqrt{6}} \end{bmatrix}}$

$D = \underline{\begin{bmatrix} -1 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 2 \end{bmatrix}}$

Solution：

6-3 example 4.

2. Prove or disprove that if A and B are orthogonal $n \times n$ matrices, then AB is orthogonal.

Solution：

6-3 example 19(f).