<div align="center">1. 請框出答案. 2. 不可使用手機、計算器，禁止作弊!</div>

1. Find an unitary matrix U and a diagonal matrix D such that $D = U^{-1}AU$, where

$$A = \begin{bmatrix} 2 & 2+i & 0 \\ 2-i & -2 & 0 \\ 0 & 0 & 2 \end{bmatrix}$$

Solution：

Similar with section 9-3 example 5 and problem 7.

2. Prove that an $n \times n$ matrix U is unitary if and only if the rows of U forms an orthonormal basis for $\mathbb{C}^n$.

Solution：

Section 9-2 problem 35.

3. Prove that for $\vec{u}, \vec{v} \in \mathbb{C}^n$, we have $\langle \vec{u}, \vec{v} \rangle = \langle \vec{v}, \vec{u} \rangle$ if and only if $\langle \vec{u}, \vec{v} \rangle$ is a real number.

Solution：

Section 9-2 problem 33(g).