姓名: SOLUTION　　葉均承　　應數一線性代數

學號: _____　　**Quiz 2**　　考試日期: 2024/09/25

1. 請框出答案. 2. 不可使用手機、計算器，禁止作弊!

1. Let $\vec{u} = [-1, 3, 4]$, $\vec{v} = [2, 1, -1]$. Compute the indicated quantity (量), if it is defined.

   $\|\vec{v} - 2\vec{u}\| =$ $\|[4, -5, -9]\| = \sqrt{122}$

2. Express the entry in the (i, j)-position, which corresponds to the i-th row and j-th column, of AB using only the entries of matrices A and B.

   參照 111 學年度第 1 學期的 quiz 2 第二題。

Circle each of the following True or False and then give a counterexample （反例） for the false statement.

3. True **False** There are exactly two unit vectors perpendicular (垂直) to any given nonzero vectors in $\mathbb{R}^n$.

Solution：

For $n = 3$, $\vec{e}_1 = [1, 0, 0]$ is perpendicular to every vector in $S = sp(\vec{e}_2, \vec{e}_3) = sp([0, 1, 0], [0, 0, 1])$.

4. True **False** Let A be an $m \times n$ matrix, and let $\vec{e}_j$ be the $n \times 1$ column vector whose j-th components are 0. We have $A\vec{e}_j$ is the j-th row vector of A

Solution：

1-3 #41 (a)

$A\vec{e}_j$ is the j-th column vector of A

5. True **False** If $AB = O$, then $A = O$ or $B = O$.

Solution：

$$\begin{bmatrix} 1 & 0 \\ 0 & 0 \end{bmatrix} \begin{bmatrix} 0 & 0 \\ 0 & 1 \end{bmatrix} = O$$