姓名: SOLUTION　　葉均承　　應數一線性代數

學號: _____　　**Quiz 2**　　考試日期: 2023/09/27

1. 請框出答案. 2. 不可使用手機、計算器，禁止作弊!

1. Compute the indicated quantity (量), if it is defined.

$$A = \begin{bmatrix} 4 & 1 & -2 \\ 1 & -2 & 3 \end{bmatrix},\ B = \begin{bmatrix} 2 & 0 & 3 \\ -1 & 1 & 2 \end{bmatrix},\ C = \begin{bmatrix} 2 & -1 \\ 0 & 5 \\ -1 & 2 \end{bmatrix}$$

(a) $(3A)(-B) =$ **undefined**　(b) $(3A)(-C) = \begin{bmatrix} -30 & 9 \\ 3 & 15 \end{bmatrix}$

2. For vectors $\vec{u}, \vec{v}$ and $\vec{w}$ in $\mathbb{R}^n$, prove that $\vec{v} - \vec{w}$ and $\vec{v} + \vec{w}$ are perpendicular(垂直) if and only if $\|\vec{v}\| = \|\vec{w}\|$.

Solution：

1-2 problem 43. 答案曾在 110 學年度第 1 學期的 quiz 2 第二題有提供過。

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

3. True **False** The magnitude of $\vec{v}+\vec{w}$ must be at least as large as the magnitude of either $\vec{v}$ or $\vec{w}$ in $\mathbb{R}^n$.

Solution：

Let $\vec{v}=[1,0]$, $\vec{w}=[-1,0]$, then $\|\vec{v}+\vec{w}\|=0<1=\|\vec{v}\|=\|\vec{w}\|$

4. 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 $S=sp(\vec{e}_2,\vec{e}_3)=sp([0,1,0],[0,0,1])$.

5. True **False** For a vector $\vec{v}$ in $\mathbb{R}^n$, the magnitude(長度) of r times $\vec{v}$ is r times the magnitude of $\vec{v}$.

Solution：

Should be the "absolute value"(絕對值) of r.