姓名: SOLUTION　　　　　　　　　　　　　　　　　　　　　葉均承　　應數一線性代數

學號: ________________　　　　**Quiz 4**　　　　考試日期: 2023/03/15

1. 請框出答案. 2. 不可使用手機、計算器，禁止作弊!

1. Find the projection of [1, -3, 2] on the subspace $W = sp([1,-1,3],[3,1,-1])$ in $\mathbb{R}^3$

   Answer:

   1. the projection = $\frac{1}{5}[3,-5,14]$ 2. $W^{\perp}$ = $sp([-2,10,4])$

   Solution：

$$\vec{b} = [1,-3,2], \vec{v}_1 = [1,-1,3], \vec{v}_2 = [3,1,-1],$$

$$\vec{v}_3 = \vec{v}_1 \times \vec{v}_2 = [-2,10,4]$$

$$\overrightarrow{b_{W^{\perp}}} = \frac{\vec{b}\cdot\vec{v}_3}{\vec{v}_3\cdot\vec{v}_3}\,\vec{v}_3 = \frac{-1}{5}[-2,10,4]$$

$$\vec{b}_W = b - \overrightarrow{b_{W^{\perp}}} = \frac{1}{5}[3,-5,14]$$

2. Circle each of the following True or False and then prove or disprove it.

   (a) True **False** Given $\vec{b}, \vec{c} \in \mathbb{R}^n$, and W is a subspace of $\mathbb{R}^n$. If $\vec{b}$ and $\vec{c}$ have the same projection on W, then $\vec{b} = \vec{c}$.

   Solution：

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   (b) **True** False Given W is a subspace of $\mathbb{R}^n$. If a vector $\vec{v}$ belongs to both W and $W^{\perp}$, then $\vec{v} = \vec{0}$.

   Solution：

   上課證過