姓名: SOLUTION　　葉均承　　應數一線性代數

學號: _____　　**Quiz 4**　　考試日期: 2026/03/25

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, 4] on the subspace $W = sp([1,0,2],[-1,1,0])$ in $\mathbb{R}^3$.

   Answer:

   1. the projection = $[-1,3,4]$　2. the orthogonal complement of the subspace $W^{\perp}$ = $\vec{0}$

   Solution：

   Similar with 6-1, example 3.

2. Let W is a subspace of $\mathbb{R}^n$, then prove or disprove that If the projection of $\vec{b}$ on W is $\vec{b}$ itself, then $\vec{b}$ is in W.

Solution：

It is True!! 6-1 #23(f).

這題只要寫出以下定理 6.1 就幾乎寫完了，但要特別注意寫出『uniquely』

Theorem 6.1

The orthogonal complement $W^\perp$ of a subspace W of $\mathbb{R}^n$ has the following properties:

4. Each vector $\vec{b}$ in $\mathbb{R}^n$ can be expressed uniquely in the form

$$\vec{b} = \vec{b}_W + \vec{b}_{W^\perp}$$

for $\vec{b}_W \in W$ and $\vec{b}_{W^\perp} \in W^\perp$.