Quiz 4

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 plane $P : 3x - y - z = 0$ in $\mathbb{R}^3$

   Answer:

   1. the projection = $\frac{-1}{11}[1, 29, 26]$ 2. the orthogonal complement of the plane $P^\perp$ = $sp([3, -1, -1])$

   Solution：

   It is obviously that the normal vector of P is $sp([3, -1, -1])$.

   Let $\vec{b} = [1, -3, 2]$ and $\vec{v}_3 = [3, -1, -1]$, then

$$\vec{b}_{W^\perp} = \frac{\vec{b} \cdot \vec{v}_3}{\vec{v}_3 \cdot \vec{v}_3} \vec{v}_3 = \frac{4}{11}[3, -1, -1]$$

$$\vec{b}_W = b - \vec{b}_{W^\perp} = \frac{-1}{11}[1, 29, 26]$$

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