姓名: SOLUTION　　葉均承　　應數一線性代數

學號: _____　　**Quiz 5**　　考試日期: 2023/10/18

不可使用手機、計算器，禁止作弊!

1. Determine whether the line $y = mx$ is a subspace of $\mathbb{R}^2$. Please give reasons to support your answer. Hint: write the line as $W = \{[x, mx] \mid x \in \mathbb{R}\}$

   Circle the answer: ($\boxed{Yes}$ / No) , and write your reason below.

Solution：

subset:
All the elements in W form as $[x, mx]$ that are vectors in $\mathbb{R}^2$.

closed under vector addition:
For any $\vec{v}, \vec{u} \in W$. Let $\vec{v} = [x, mx], \vec{u} = [y, my]$, $x, y \in \mathbb{R}$.
Since $\vec{v} + \vec{u} = [x, mx] + [y, my] = [(x + y), m(x + y)]$, we have $(\vec{v} + \vec{u}) \in W$.

closed under scalar multiplication:
For any $\vec{v} \in W$, any $r \in R$. Let $\vec{v} = [x, mx]$, $x \in \mathbb{R}$.
Since $r\vec{v} = r[x, mx] = [rx, m(rx)] \in W$.

Hence W is a subspace of $\mathbb{R}^2$

2. Mark the following True or False and then prove or disprove it.

   True False If A^2 is an invertible matrices, then A^3 is an invertible matrices.

Solution：

1-5 (e)