姓名: SOLUTION　　葉均承　　應數一線性代數

學號: _____　　**Quiz 12**　　考試日期: 2024/12/11

不可使用手機、計算器，禁止作弊!

1. Determinant whether the given 4 points lie in a plane in $\mathbb{R}^3$. If so, find its area. If not, find its volume (四點所圍成的體積或面積).

$$A(2,0,0), B(3,2,5), C(1,2,-1), D(1,6,1)$$

Answer: ☒ $ABCD$ are coplanar(共平面), and the area is ____ .

☑ $ABCD$ are NOT coplanar(共平面), and the volume is **4/3** .

Solution：

Similar with 111-1 quiz 12 and 4-1 problem 59. The volume is not 0, thus they are NOT coplanar.

Note that the volume of a tetrahedron (四面體) $ABCD$ formed by coterminous (相鄰邊) edges $\overrightarrow{AB}, \overrightarrow{AC}, \overrightarrow{AD}$ is

$$\frac{\text{volume of the Parallelepiped}}{6}$$

2. Find the determinant of the given matrix.

$$A = \begin{pmatrix} 2 & 0 & 0 & 5 & 0 & 0 \\ 0 & 3 & 0 & 0 & 4 & 0 \\ 1 & 0 & 4 & 0 & 0 & 0 \\ 0 & 0 & 0 & 6 & 0 & 0 \\ 0 & 1 & 0 & 0 & 5 & 0 \\ 3 & 0 & 2 & 0 & 0 & 7 \end{pmatrix}$$

Answer: $\det(A) =$ **3686** .

Solution：

Similar with section 4-2 example 3.