Problem Set 1 —— Linear Algebra A (Fall 2021)

Dr. Y. Chen

Please hand in your assignment at the beginning of your first tutorial session!

1. Solve the following equations.

   (1)
   $$\begin{bmatrix} 2 & 5 \\ 1 & 3 \end{bmatrix} X = \begin{bmatrix} 4 & -6 \\ 2 & 1 \end{bmatrix}$$

   (2)
   $$X \begin{bmatrix} 2 & 1 & -1 \\ 2 & 1 & 0 \\ 1 & -1 & 1 \end{bmatrix} = \begin{bmatrix} 1 & -1 & 3 \\ 4 & 3 & 2 \end{bmatrix}$$

   Hint: Here X is a matrix.

2. Consider an $n \times n$ system of linear equations, and each equation represents a plane. Now consider all these n planes and try your best to explain why the following statement makes sense:
   If the n planes have no point in common, or infinitely many points, then the n columns lie in the same plane.

3. 证明：两个 n 阶下三角矩阵的乘积仍是下三角矩阵.

4. 求平方等于零矩阵的所有二阶矩阵.

5. 证明: 对方程组做初等行变换的变形是同解变形.