**Assignment 6**
**Due date: 14 May 2021**
**TA: 林宏懌 E817 (13:10~14:00)**

1. Show that

$$\det(A) = \frac{1}{2}\begin{vmatrix} \operatorname{tr}(A) & 1 \\ \operatorname{tr}(A^2) & \operatorname{tr}(A) \end{vmatrix}$$

for every $2 \times 2$ matrix A.

2. Show that the matrices $A = \begin{bmatrix} a & b \\ 0 & c \end{bmatrix}$ and $B = \begin{bmatrix} d & e \\ 0 & f \end{bmatrix}$ commute if and only if

$$B = \begin{vmatrix} b & a-c \\ e & d-f \end{vmatrix} = 0.$$

**Note**: Matrices *A* and *B commute* if *AB* = *BA*.