**Assignment for Section 3.1: The properties of determinants**

(1) Find the determinant of
$$Q = \begin{bmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{bmatrix}.$$

(2) Let $A = \begin{bmatrix} 4 & 1 \\ 2 & 3 \end{bmatrix}$. Find $A^2, A^{-1}$ and their determinants.

(3) Find the determinant of
$$A = \begin{bmatrix} 0 & 1 & 1 \\ 1 & 0 & 1 \\ 1 & 1 & 0 \end{bmatrix}.$$

(4) By applying row operations to produce an upper triangular $U$, compute
$$\det \begin{bmatrix} 1 & 2 & 3 & 0 \\ 2 & 6 & 6 & 1 \\ -1 & 0 & 0 & 3 \\ 0 & 2 & 0 & 7 \end{bmatrix}.$$