

### **Tutorial 3**

#### **Determinants**

1. If a  $3 \times 3$  matrix  $A$  has  $|A| = -1$ , find  $|\frac{1}{2}A|$ ,  $|-A|$ ,  $|A^2|$  and  $|A^{-1}|$ .
2. Reduce  $A = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 2 & 3 \\ 1 & 2 & 2 \end{bmatrix}$  to  $U$  to find  $|A|$  as the product of pivots.
3. Using variables  $a, b, c$ , construct a  $3 \times 3$  skew-symmetric matrix ( $A = -A^T$ ). Show that the determinant of such a matrix is equal to 0.
4. Find the volume of the parallelepiped with one vertex at the origin and adjacent vertices at  $(1, 3, 0)$ ,  $(-2, 0, 2)$  and  $(-1, 3, -1)$ .

#### **Answers**

1.  $-1/8$ ,  $1$ ,  $1$ ,  $-1$
2.  $-1$
- 3.
4.  $18$

End