2.3.3 The volume of a box

Remark 23: If $A = (A_1\ A_2\ \cdots\ A_n) \in M_{n\times n}(\mathbb{R})$, then $|\det(A_1)|$ is the n-dimensional volume of the parallelepiped having the vectors $A_1, A_2, \ldots, A_n$ as adjacent sides.

Example 24: 平行六面体，以向量 $A_1 = (1, -2, 1)$, $A_2 = (1, 0, -1)$, $A_3 = (1, 1, 1)$ 為边，则此平行六面体的体积為

$$\left|\det\begin{pmatrix} 1 & 1 & 1 \\ -2 & 0 & 1 \\ 1 & -1 & 1 \end{pmatrix}\right| = |2 + 1 - (-1) - (-2)| = 6$$