a) $\det\left(\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}\right)$

$= 1 \times 4 - 3 \times 2$

$= -2$

b) $\det\left(\begin{bmatrix} 3 & 4 \\ 1 & 2 \end{bmatrix}\right)$

$= 3 \times 2 - 4 \times 1$

$= \underline{\underline{2}}$

c) $\det\begin{pmatrix} 1 & 1 & 1 \\ 1 & 2 & 3 \\ 1 & 2 & 7 \end{pmatrix}$

$= 1\times(2\times7 - 3\times2)$

$- 1(7-3)$

$+ 1(2-2)$

$= 8 - 4 = 4.$

d) $\det \begin{pmatrix} 1 & 2 & 3 \\ 0 & 0 & 0 \\ 1 & 3 & 4 \end{pmatrix}$

$= 0.$

E3.8)

$$\text{Vol} = \det\begin{pmatrix}\vec{u}\\ \vec{v}\\ \vec{w}\end{pmatrix}$$

$$= \det\begin{pmatrix}1 & 2 & 3\\ 2 & -2 & 4\\ 2 & 2 & 5\end{pmatrix}$$

$$= 1\times(-10-8)$$

$$-2(10-8)$$

$$+3(4+4)$$

$$= -18 - 4 + 24 = 2\,\text{cm}^3$$

3. 9) is the set of vectors linearly independent?

$\vec{u} = (1, 2, 3)$

$\vec{v} = (2, -2, 4)$

$\vec{w} = (2, 2, 5)$

essentially,

$x_1\vec{u} + x_2\vec{v} + x_3\vec{w} = \vec{0}$

if there exists x_1, x_2, x_3 such that $x_i != 0$, then no

$$\det\begin{pmatrix} 1, & 4, & 3 \\ 2, & 1, & 1 \\ 0, & -2, & -1 \end{pmatrix}$$

$$= 1(-1+2) - 4(-2) + 3(-4)$$

$$= 1 + 8 - 12 = -3.$$

yes. linearly independent!