$$L_1: \begin{cases} x = 1+t \\ y = 1-t \\ z = 2t \end{cases} \qquad L_2: \begin{cases} x = 2-t \\ y = t \\ z = 2 \end{cases}$$

$$\vec{u_1} = \langle 1, -1, 2 \rangle \qquad \vec{u_2} = \langle -1, 1, 0 \rangle$$

$$\vec{n} = \vec{u_1} \times \vec{u_2} = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 1 & -1 & 2 \\ -1 & 1 & 0 \end{vmatrix} = \langle -2, -2, 0 \rangle$$

$$-2(x-1) - 2(y-1) = 0 \qquad\qquad -2(x-2) - 2(y-0) = 0$$

$$-2x + 2 - 2y + 2 = 0 \qquad\qquad -2x + 4 - 2y = 0$$

$$2x + 2y = 4 \qquad\qquad 2x + 2y = 4$$

$$\underline{x + y = 2} \qquad\qquad \underline{x + y = 2}$$

$$x(1 - 1 + 2i) + y(4 - 1 - 4i) = 3 + 10i$$

$$2ix + 3y - 4iy = 3 + 10i$$

$$3y + i(2x - 4y) = 3 + 10i$$

$$3y = 3 \qquad\qquad 2x - 4y = 10$$

$$y = 1 \qquad\qquad 2x - 4 = 10$$

$$2x = 14$$

$$x = 7$$

$$x + y = 7 + 1 = 8$$

$$(x+iy) - 8 = i(7 - 2\bar{z})$$

$$x+iy - 8 = 7i - 2i(x-iy)$$

$$x-8+iy = 7i - 2ix - 2y$$

$$x-8+iy = -2y + i(7-2x)$$

$$7-2x = y \qquad\qquad x-8 = -2y$$

$$2x+y = 7 \qquad\qquad x+2y = 8$$

$$2x+y = 7$$
$$\underline{2x + 4y = 16}$$
$$-3y = -9$$
$$y = 3$$

$$x = \frac{7-y}{2}$$

$$\therefore \frac{4}{2}$$

$$x = 2$$

$$|z| = \sqrt{x^2 + y^2}$$
$$= \sqrt{4+9}$$
$$= \sqrt{13}$$

$$2 - 2t + 2(3t) - (1+t) = 7$$
$$2 - 2t + 6t - 1 - t = 7$$
$$1 + 3t = 7$$
$$t = 2$$

$$x = 2 - 2t = 2 - 4 = -2$$
$$y = 3t = 6$$
$$z = 1 + t = 3$$

$$(a, b, c) = -2, 6, 3$$

$$a + b + c = -2 + 6 + 3$$
$$= 7$$

$$\vec{a} \cdot \vec{b} = \|\vec{a}\| \|\vec{b}\| \cos \theta$$
$$2 + x = \sqrt{6} \sqrt{x^2+1} \; \frac{1}{\sqrt{2}}$$
$$2 + x = \sqrt{8(x^2+1)}$$
$$x^2 + 4 + 4x = 3x^2 + 3$$
$$0 = 2x^2 - 4x - 1$$
$$2x^2 - 4x - 1 = 0$$

$$x = \frac{4 \pm \sqrt{16 - 4(2)(-1)}}{4}$$
$$= \frac{4 \pm \sqrt{16 + 8}}{4}$$
$$= \frac{1 + \sqrt{6}}{2}$$

$\det A = x(-3+x) = 0$

$$x(x-3) = 0$$

$$x = 0 \quad \text{OR} \quad x = 3$$

$\therefore$ Sum $= 3$

$\vec{a} \cdot \vec{b} = \sqrt{15}$

$\vec{a} \times \vec{b} = \langle -2, 0, 1 \rangle$

$\vec{a} \cdot \vec{b} = \| \vec{a} \| \| \vec{b} \| \cos\theta$

$\vec{a} \times \vec{b} = \| \vec{a} \| \| \vec{b} \| \sin\theta$

$\sin\theta = \dfrac{\| \vec{a} \times \vec{b} \|}{\| \vec{a} \| \| \vec{b} \|}$ $\qquad\qquad \cos\theta = \dfrac{\vec{a} \cdot \vec{b}}{\| \vec{a} \| \| \vec{b} \|}$

$\tan\theta = \dfrac{\| \vec{a} \times \vec{b} \|}{\| \vec{a} \| \| \vec{a} \|} \times \dfrac{\| \vec{a} \| \| \vec{b} \|}{\vec{a} \cdot \vec{b}}$ $\qquad\qquad$ $\sin / \cos = \tan$

$\qquad = \dfrac{\sqrt{4+1}}{\sqrt{15}}$

$\qquad = \dfrac{\sqrt{5}}{\sqrt{15}}$

$\qquad = \dfrac{1}{\sqrt{3}}$

$\theta = \tan^{-1}\left(\dfrac{1}{\sqrt{3}} \right)$

$\qquad = \pi/6$

IA1: