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TW/AM 20753-242	TUTTOETS 1 / TUT TEST 1	
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[7.6] Lines and Planes in 3D

1 Vind die vektor-parametriese vergelyking (in terme van t) van lyn L, wat deur punt r_1 gaan en parallel aan die lyn M is.

Find the vector parametric equation (in terms of t) of the line L going through point r_1 and that is parallel to line M.

$$r_1 = \begin{bmatrix} 1 \\ 1 \\ 2 \end{bmatrix}$$

$$M: x - 3 = \frac{5 - y}{2} = 1 - z = \frac{y - 5}{-2} = \frac{z - 1}{-1}$$

$$M: \left. \begin{matrix} x = 3 + t \\ y = 5 - 2t \\ z = 1 - t \end{matrix} \right\} \underline{a} = \begin{bmatrix} 1 \\ -2 \\ -1 \end{bmatrix}$$

$$L: r(t) = \begin{bmatrix} 1 \\ 1 \\ 2 \end{bmatrix} + t \begin{bmatrix} 1 \\ -2 \\ -1 \end{bmatrix}$$

2 Vind die vergelyking (in terme van x , y en z) van die vlak wat die volgende twee lyne bevat:

Find the equation (in terms of x , y en z) of the plane that contains the following two lines:

$$\text{Line (1): } \underline{a}_1 = \begin{bmatrix} 2 \\ 2 \\ 0 \end{bmatrix} \quad \underline{r}_1 = \begin{bmatrix} 0 \\ 1 \\ 1 \end{bmatrix}$$

Lyn/Line (1):

$$\begin{matrix} x = 2t \\ y = 1 + 2t \\ z = 1 \end{matrix}$$

Lyn/Line (2):

$$\begin{matrix} x = 2 - t \\ y = 3 + t \\ z = 1 + t \end{matrix}$$

$$\text{Line (2): } \underline{a}_2 = \begin{bmatrix} -1 \\ 1 \\ 1 \end{bmatrix}$$

$$\underline{n} = \underline{a}_1 \times \underline{a}_2 = \begin{bmatrix} 2 \\ 2 \\ 0 \end{bmatrix} \times \begin{bmatrix} -1 \\ 1 \\ 1 \end{bmatrix} = \begin{bmatrix} 2 \cdot 0 - 0 \cdot 1 \\ 0 \cdot (-1) - 2 \cdot 1 \\ 2 \cdot 1 - 2 \cdot (-2) \end{bmatrix}$$

$$\underline{n} = \begin{bmatrix} 2 \\ -2 \\ 4 \end{bmatrix} \quad \underline{n} \cdot \underline{r}_1 = \begin{bmatrix} 2 \\ -2 \\ 4 \end{bmatrix} \cdot \begin{bmatrix} 0 \\ 1 \\ 1 \end{bmatrix} = -2 + 4 = 2 \checkmark$$

$$2x - 2y + 4z = 2$$

$$\text{or } x - y + 2z = 1$$

$$\boxed{x - y + 2z = 1} \checkmark$$

$$\text{or } 2x - 2y + 4z = 2$$