Assessment Quiz 3 Unit 7

1. Find the symmetric equations of the line that passes through the points (-1, 2, 5) and (-3, -6, 4).

2. State the coordinates of three points on the line

$$\frac{x-4}{3} = \frac{5-z}{2},\ y = -7$$

$\frac{z-5}{-2}$ ✓

1. $\vec{m} = (-2, -8, -1)$

$$\frac{x+1}{-2} = \frac{y-2}{-8} = \frac{z-5}{-1}$$

$$\frac{x+1}{-2} = \frac{2-y}{8} = 5-z$$

2. $(4, -7, 5)$ $(10, -7, 1)$

$(7, -7, 3)$

$\vec{r} = (4, -7, 5) + t(3, 0, -2)$

$, t \in \mathbb{R}$

L4(8.4) Vector & Parametric Equations of a Plane

The vector equation of a plane has the form:

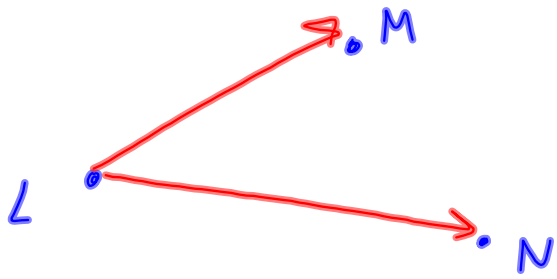
$$\vec{r} = \vec{r_0} + s\vec{a} + t\vec{b}$$
$$(x,y,z) = (x_0,y_0,z_0) + s(a_1,a_2,a_3) + t(b_1,b_2,b_3)$$

Where $\vec{a}$ and $\vec{b}$ are noncollinear directional vectors for the plane
$\vec{r_0}$ is the position vector of a point in the plane
$\vec{r}$ is the position vector of any point in the plane
s and t are parameters (elements of the real numbers)

Parametric Equations of a Plane:

$$x = x_0 + sa_1 + tb_1$$
$$y = y_0 + sa_2 + tb_2$$
$$z = z_0 + sa_3 + tb_3$$

Ex1: Find the vector equation of the plane containing the points L(1,2,5), M(-7,4,0) and N(3,1,-2).



$\vec{LM} = (-8, 2, -5)$

$\vec{LN} = (2, -1, -7)$

$\vec{r} = (1, 2, 5) + s(-8, 2, -5) + t(2, -1, -7)$

$, s, t \in \mathbb{R}.$

Ex2: Does the point (4,5,-3) lie in the plane
① $x = 4 + 3s - 6t$, ② $y = 1 - 2s + 6t$, ③ $z = 6 + s - t$

① $x = 4+3s-6t$
② $y = 1-2s+6t$
① + ② σ $(x,y) = (4,5)$

$9 = 5 + s$

$s = 4$, sub into ①

① $4 = 4+3(4)-6t$

$t = 2$

ARA checked these using ② & ③

$\Leftarrow$ $\begin{cases} s = 12.5 \\ t \doteq 4.8 \end{cases}$ NOT CONSISTENT

What do you notice about the values of A and B?

sub in $s=4$ $t=2$ to verify in ③

LS	RS
$z = -3$	$6+s-t$
	$= 6+4-2$
	$= 8$

$\therefore LS \neq RS$

$\therefore$ The point $(4,5,-3)$ does not lie in the plane.

Ex3: Where does the plane π intersect with the line L.

π: $\vec{r} = (6,-2,-3) + m(1,3,0) + n(2,2,-1)$

L: $\vec{r} = t(0,1,0)$

Set L = π to find intersection(s).

$t(0,1,0) = (6,-2,-3) + m(1,3,0) + n(2,2,-1)$

x: $0 = 6 + m + 2n$

y: $t = -2 + 3m + 2n$

z: $0 = -3 - n$

WILL SOON SOLVE W/ MATRICES.

$n = -3$

$m = 0$

$t = -2 + 3(0) + 2(-3)$

$= -8$

Sub $t = -8$ into L: to find point of intersection $(0,-8,0)$.

Assigned Work:

p.459-460 #1, 2, 3, 4, 6, 8a,
9, 10, 11, 12b