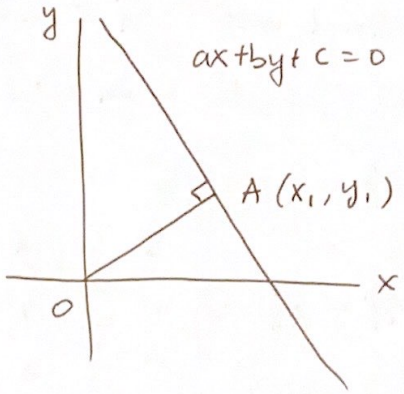
Assignment 2

1. $ax+by+c=0$

(20) $y = -\frac{a}{b}x - \frac{c}{b}$



Point $A(x_1, y_1)$ is on the line

$ax_1+by_1+c=0$

Segment OA is $\perp$ to the line

$\therefore -\frac{a}{b}\cdot\frac{y_1}{x_1} = -1$

$\therefore x_1 = \frac{-ac}{a^2+b^2} \quad y = \frac{-bc}{a^2+b^2}$

$\therefore d = \sqrt{x_1^2+y_1^2} = \frac{|c|}{\sqrt{a^2+b^2}}$ //

2.

(15) $2x+3y-4z+D=0$

passes thru $(2,-1,3)$

$2(2)+3(-1)-4(3)+D=0$

$D=11$

$\therefore 2x+3y-4z+11=0$ //

only practice (not necessary)

$\frac{x+1}{2} = \frac{y-1}{2} = \frac{z-0}{-4} = t$

$x = 2t-1$

$y = 2t+1$

$z = -4t$

3. let $P(0,1,1)$, $Q(1,0,1)$ and $R(1,1,0)$

(20)

$\vec{PQ} = \langle 1-0, 0-1, 1-1\rangle = \langle 1,-1,0\rangle$

$\vec{QR} = \langle 1-1, 1-0, 0-1\rangle = \langle 0,1,-1\rangle$

$\vec{n} = \vec{PQ} \times \vec{QR}$

$\vec{n} = \langle 1,1,1\rangle = \vec{i}+\vec{j}+\vec{k}$

$\therefore$ using $(0,1,1)$ we have $(x-0)+(y-1)+(z-1)=0$

$x+y+z=2$ //

4.

directional vector $\vec{u} = \langle 3, -2, 4 \rangle$

(20) $B(-2, 0, 1)$ when $t = 0$

$\vec{AB} = \langle 5, -1, 3 \rangle$

$$\vec{u} \times \vec{AB} = \begin{vmatrix} \vec{i} & \vec{j} & \vec{k} \\ 3 & -2 & 4 \\ 5 & -1 & 3 \end{vmatrix} = \langle -2, 11, 7 \rangle$$

$$D = \frac{\|\vec{u} \times \vec{AB}\|}{\|\vec{u}\|} = \frac{\sqrt{174}}{\sqrt{29}} = \sqrt{6}$$

5.

(10) $x = 1 + t$

$y = -2 + t$

$z = 4 - t$

where direction w/ the $t\langle 1, 1, -1 \rangle$

point $(1, -2, 4)$

$x \quad y \quad z$

(15) 6. (a) let $\vec{u} = \overrightarrow{P_0P_1} = \langle 1, -5, 4 \rangle$

$\therefore$ parametric equation

$x = 2 + t \quad y = 4 - 5t \quad z = -3 + 4t$

(b) yz-plane when $x = 0$

This implies $t = -2$

$\therefore y = 14$ and $z = -11$

$\therefore (0, 14, -11)$