Math 201-13 Quize #3A Sem 041

Name: Key I.D.#__________ Serial #_____

Q1: Find equation of the plane that contains the line $x = 2 + t$, $y = 1 - 2t$, $z = 2t$ and the point $P(1,0,-1)$

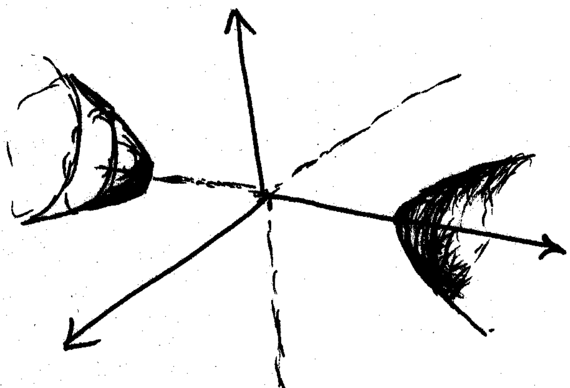
$Q(2,1,0)$, $\vec{PQ} = \langle 1, 1, +1 \rangle$; $\vec{v} = \langle 1, -2, 2 \rangle$

$$\vec{n} = \vec{PQ} \times \vec{v} = \begin{vmatrix} i & j & k \\ 1 & 1 & 1 \\ 1 & -2 & 2 \end{vmatrix} = i(2+2) - j(2-1) + \vec{k}(-2-1)$$
$$= 4\vec{i} - \vec{j} - 3\vec{k}$$

$$4(x-1) - (y-0) - 3(z+1) = 0$$
$$4x - y - 3z - 7 = 0$$

Q2: Identify and sketch the surface $9x^2 - 4y^2 + 9z^2 + 36 = 0$

$-\frac{x^2}{4} + \frac{y^2}{9} - \frac{z^2}{4} = 1$ Hyperboloid of two sheets



Q3: Find distance between the line $L_1 : x = -1 + 2t,\ y = 1 - t,\ z = 1 - 2t$, and the plane $x + 4y - z + 2 = 0$. $P(-1, 1, 1)$

$$D = \frac{|-1 \cdot 1 + 4 \cdot 1 - 1 \cdot 1 + 2|}{\sqrt{1 + 16 + 1}} = \frac{4}{\sqrt{18}}$$

Math 201-16 Quize #3A Sem 041

Name: Key I.D.#__________ Serial #_____

Q1: Find equation of the plane that contains the two parallel lines
$L_1 : x = 2 + t\ ,\ y = 1 - 2t\ ,\ z = 2t$ and $L_2 : x = 1 + 2t,\ y = -4t,\ z = 1 + 4t$

$\vec{v}_1 = \langle 1, -2, 2 \rangle, \quad \vec{v}_2 = \langle 2, -4, 4 \rangle$

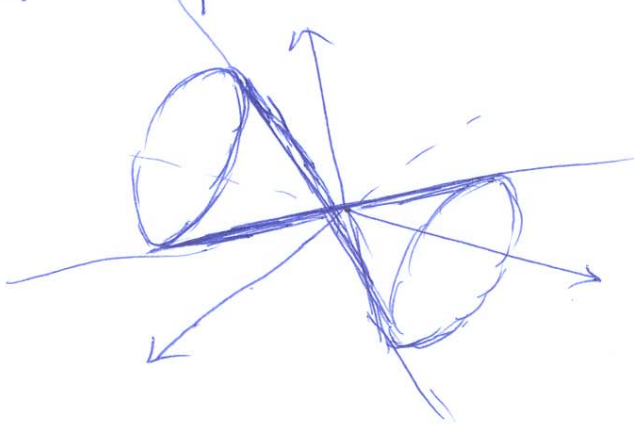
$P_1(2,1,0), \quad P_2(1,0,1), \quad \vec{P_1P_2} = \langle -1, -1, 1 \rangle$

$$\vec{n} = \vec{P_1P_2} \times \vec{v}_1 = \begin{vmatrix} i & j & k \\ -1 & -1 & 1 \\ 1 & -2 & 2 \end{vmatrix} = i(-2+2) - j(-2-1) + \vec{k}(2+1)$$
$$= 3\vec{j} + 3\vec{k}$$

Eq. of the plane: $0(x-2) + 3(y-1) + 3(z-0) = 0$
$$3y + 3z - 3 = 0$$

Q2: Identify and sketch the surface $9x^2 - 4y^2 + 36z^2 = 0$

it is a cone $\frac{x^2}{4} - \frac{y^2}{9} + z^2 = 0$



Q3: Find distance between the two parallel planes $2x + 2y - z + 2 = 0$, and $-4x - 4y + 2z - 3 = 0$.
$\vec{n}_1 = \langle 2, 2, -1 \rangle, \ \vec{n}_2 = \langle -4, -4, 2 \rangle$

let P_1 on the plane 1, $P_1(0,0,2)$

$$D = \frac{|0 + 0 + 4 - 3|}{\sqrt{16 + 16 + 4}} = \frac{1}{6}$$

Math 201-13 Quize #3B Sem 041

Name: Key I.D.#__________ Serial #_____

Q1: Find distance between the line $L_1 : x = 2 + t,\ y = 1 - 2t\ ,\ z = 3 + t$, and the plane $3x + y - z + 1 = 0$. A point on the line $P(2,1,3)$

$$D = \frac{|2 \cdot 3 + 1 \cdot 1 + 3(-1) + 1|}{\sqrt{9+1+1}} = \frac{5}{\sqrt{11}}$$ is the distance

Q2: Find equation of the plane that contains the line $x = 2 - 2t\ ,\ y = t\ ,\ z = 1 + 2t$ and the point $P(2,1,0)$

Let $Q(2,0,1)$

$\vec{PQ} = \langle 0, -1, 1 \rangle$, $\vec{v} = \langle -2, 1, 2 \rangle$

$$\vec{PQ} \times \vec{v} = \begin{vmatrix} \hat{i} & \hat{j} & k \\ 0 & -1 & 1 \\ -2 & 1 & 2 \end{vmatrix} = \vec{i}(-2-1) - \vec{j}(0+2) + \vec{k}(0-2) = -3\vec{i} - 2\vec{j} - 2\vec{k}$$

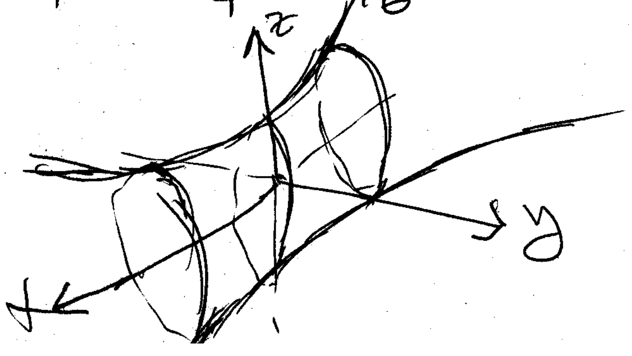
∴ The equation of the plane is

$-3(x-2) - 2(y-1) - 2(z-0) = 0$ $-3x - 2y - 2z + 8 = 0$

Q3: Identify and sketch the surface $4x^2 - 4y^2 - z^2 + 16 = 0$

$4x^2 - 4y^2 - z^2 = -16$

$-\frac{x^2}{4} + \frac{y^2}{4} + \frac{z^2}{16} = 1$ Hyperboloid of one-sheet



Math 201-16 Quize #3B Sem 041

Name: Key I.D.#________ Serial #_____

Q1: Find equation of the plane that contains the two parallel lines
$L_1 : x = -2t\ ,\ y = 1 + t\ ,\ z = 2t$ and $L_2 : x = 1 + 4t,\ y = -2t,\ z = 2 - 4t$

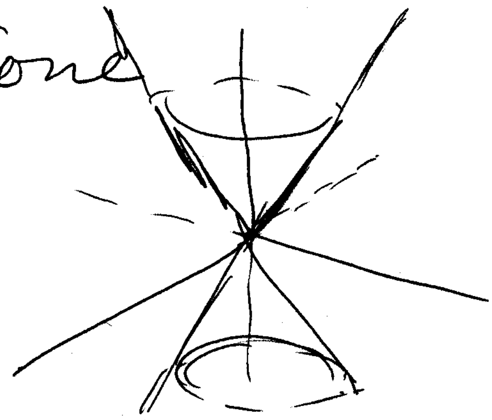
$P_1(0,1,0)$, $P_2(1,0,2)$, $\vec{V_1} = \langle -2,1,2 \rangle$, $\vec{V_2} = \langle 4,-2,-4 \rangle$

$\vec{P_1P_2} = \langle 1,-1,2 \rangle$, $\vec{n} = \vec{P_1P_2} \times \vec{V_1} = \begin{vmatrix} i & j & k \\ 1 & -1 & 2 \\ -2 & 1 & 2 \end{vmatrix} = i(-4) - j(6) + k(-1)$
$= -4i - 6j - k$

∴ The eq. of the plane is
$-4(x-0) - 6(y-1) - (z-0) = 0$
$\boxed{-4x - 6y - z + 6 = 0}$

Q2: Identify and sketch the surface $-4x^2 - 4y^2 + 16z^2 = 0$

$\frac{x^2}{4} + \frac{y^2}{4} - z^2 = 0$ Cone



Q3: Find distance between the two parallel planes $-x + 2y + 2z + 3 = 0$, and $2x - 4y - 4z + 1 = 0$. $\vec{n_1} = \langle -1,2,2 \rangle$, $\vec{n_2} = \langle 2,-4,-4 \rangle$

$P_1(3,0,0)$ on plane 1

$D = \frac{|6+1|}{\sqrt{4+16+16}} = \frac{7}{6}$ is the distance