

Quiz 3

Problem 1 Find the parametric equations for the intersection of the planes

$$2x + y - 3z = 0 \text{ and } x + y = 1.$$

$$x = 1 - y$$

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

$$2 - 2y + y - 3z = 0$$

$$2 = y + 3z$$

$$\begin{pmatrix} 1 \\ 1 \\ 0 \end{pmatrix}, \begin{pmatrix} 1 \\ 0 \\ 1 \end{pmatrix}$$

$$\begin{matrix} x = 2 & x = -1 \\ y = -1 & y = 2 \\ z = 1 & z = 0 \end{matrix}$$

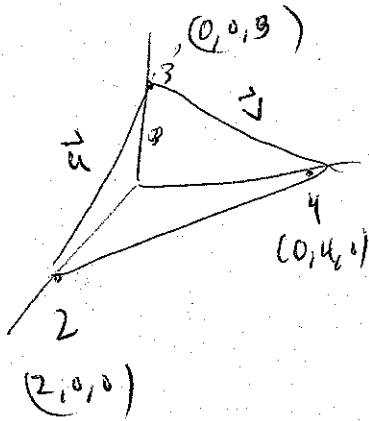
2 pts
 ~~$y = -2$~~
 ~~$x = -1$~~

$$r(t) = \langle 2, -1, 1 \rangle + t \langle 3, -3, 1 \rangle$$

Problem 2 The plane

$$\frac{x}{2} + \frac{y}{4} + \frac{z}{3} = 1$$

intersects the x -, y -, z -axes in points P, Q, R . Find the area of triangle PQR .



Area of the parallelogram is

$\|u\| \|v\| \sin \theta$ so the triangle is over 2.

$$\text{So } \vec{u} = \langle 2, 0, -3 \rangle$$

$$\vec{v} = \langle 0, 4, -3 \rangle$$

$$\frac{\| \vec{u} \times \vec{v} \|}{2} =$$

Problem 3 Describe, with justification what is obtained when, in the equation

$$\pm 8x^2 \pm 3y^2 \pm z^2 = 1$$

we choose

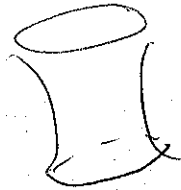
(1) all plus signs,

ellipsoid, all slices are ellipses ~~points~~ a point or nothing

(2) two plus signs,

$$8x^2 + 3y^2 - z^2 = 1$$

$z=c$ slices are always ellipses



(3) one plus sign,

$$8x^2 - 3y^2 - z^2 = 1$$



$z=c$ slices are hyperbolas

~~all slices are hyperbolas~~

$x=y$ slices are hyperellipses

except when they're not

(4) no plus signs.

no solution, so nothing