* Chapter 1-2
L> Assignment 1

PROBLEM SET 2

* PARAMETRIC FORM:
- $x(t) = a + pt$
- $y(t) = b + qt$
- $z(t) = c + rt$

1) $(1,2,-1)$ & $(2,0,3)$

(a)

$$r(t) = \begin{pmatrix}1\\2\\-1\end{pmatrix} + t\begin{pmatrix}-1\\2\\-4\end{pmatrix}$$

$$\begin{pmatrix}1\\2\\-1\end{pmatrix} - \begin{pmatrix}2\\0\\3\end{pmatrix} = \begin{pmatrix}-1\\2\\-4\end{pmatrix}$$

$r(t) = 1 - t$

$r(t) = 2 + 2t$

$r(t) = -1 - 4t$ (?)

$$\begin{pmatrix}x\\y\\z\end{pmatrix} = \begin{pmatrix}1\\2\\-1\end{pmatrix} + t\begin{pmatrix}-1\\2\\-4\end{pmatrix}$$

$x(t) = -t$

$y(t) = 2 + 2t$

$z(t) = -1 - 4t$

$(1,2,-1)$ $(2,0,3)$

$(u,v) = (0,0)$ $(u,v) = (1,0)$

$a = 1$

$b = 2$

$c = -1$

$2 = 1 + p$

$0 = 2 + q$

$3 = -1 + r$

$p = 1$

$q = -2$

$r = 4$

PARAMETRIC:

$x(u,v) = 1 + u$

$y(u,v) = 2 - 2u$

$z(u,v) = -1 + 4u$

$x(t) = 2 + t$

$y(t) = -2t$

$z(t) = 3 + 4t$

(b) distance: $(1,0,1)$

2) $(1,2,-1)$; $(2,0,3)$; $(-1,-1,0)$

$a = 1$
$b = 2$
$c = -1$

$2 = 1 + p$
$0 = 2 + q$
$3 = -1 + r$

$p = 1$
$q = -2$
$r = 4$

$-1 = 1 + l$
$-1 = 2 + m$
$0 = -1 + n$

$l = -2$
$m = -3$
$n = 1$

$\therefore$ $x(u,v) = 1 + u - 2v$
$y(u,v) = 2 - 2u - 3v$
$z(u,v) = -1 + 4u + v$

} PARAMETRIC FORM

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3) $3x + 4y - z = 2$ & $x(t) = 2 - 2t$
$y(t) = -1 + 3t$
$z(t) = -t$

$\begin{pmatrix} x \\ y \\ z \end{pmatrix} = \begin{pmatrix} 2 \\ -1 \\ 0 \end{pmatrix} + t\begin{pmatrix} -2 \\ 3 \\ -1 \end{pmatrix}$

(a) $3(2-2t) + 4(-1+3t) - (-t) = 2$
$6 - 6t + (-4 + 12t) + t = 2$
$6 - 6t - 4 + 12t + t = 2$
$6 - 4 + 6t + t = 2$
$2 + 7t = 2$
$7t = 0$
$t = 0$

$z(0) = -(0)$
$z = 0$

$x(0) = 2 - 2(0)$
$x = 2$

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

$\therefore \begin{pmatrix} 2 \\ -1 \\ 0 \end{pmatrix}$

(b) $\begin{pmatrix} 2 \\ -1 \\ 0 \end{pmatrix}$

(c) angle where it intersects the plane (use dot product)

4) minimum distance between

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

&

$x(s) = 3s$
$y(s) = 1 - 2s$
$z(s) = 2 - s$

(use scalar projection)

5) distance between parallel planes

$2x - y + 3z = -4$ & $2x - y + 3z = 24$

6) $3x + 4y - z = 2$ & $-2x + y + 2z = 6$

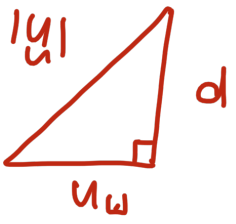
(a) where intersect x, y, z axis

(b) normal vector (perpendicular)

(c) line equation of planes intersection (use normal vector)

(d) angle between 2 planes

Pythagoras' Theorem : $a^2 + b^2 = c^2$



$$d = \sqrt{|\underset{\sim}{y}|^2 - |u_w|^2}$$

$$d = \sqrt{(\sqrt{5})^2 - (9/\sqrt{21})^2}$$