

# Homework:

Linear Algebra for Data Science

(Class 8-Oct-22)

Topic : Plane & Regularization

1)  $4x - 2y + 5z = 20$

Sol.  
 $\text{det} \begin{pmatrix} 4 & -2 & 5 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \end{pmatrix} \neq 0$   
 $\Rightarrow \text{No solution}$

Step 1

①  $4x - 2y + 5z = 20$

$x = ?$

$y = 0, z = 0 \Rightarrow x = ?$

②  $x = 5, y = 0, z = 0$

1.1)  $x \quad y \quad z$

1.1)  $x = 5, y = 0, z = 0$

$4x - 2y + 5z = 20$

$(x, y, z) = (5, 0, 0) \text{ satisfies}$  ①

$4(5) - 2(0) + 5(0) = 20$

$4x = 20$

$\therefore x = 5$

1.2)  $y = ?$

$(x, y, z) = (0, y, 0) \text{ satisfies}$  ①

$4(0) - 2(y) + 5(0) = 20$

L2

$$-2y = 20$$

$$\therefore y = -10 \quad \cancel{\text{X}}$$

1.3)  ~~$\sigma = \sqrt{x^2 + y^2 + z^2}$~~

$$\text{Winkel } (x, y, z) = (0, 0, z) \text{ mit } ①$$

~~$4x^2 + 4y^2 + 25z^2 = 20$~~ 

$$4(0) - 2(0) + 5(z^2) = 20$$

$$5z^2 = 20$$

$$\therefore z = 4 \quad \cancel{\text{X}}$$

mit 1.1) - 1.3)

~~$4x^2 + 4y^2 + 25z^2 = 20$~~ 

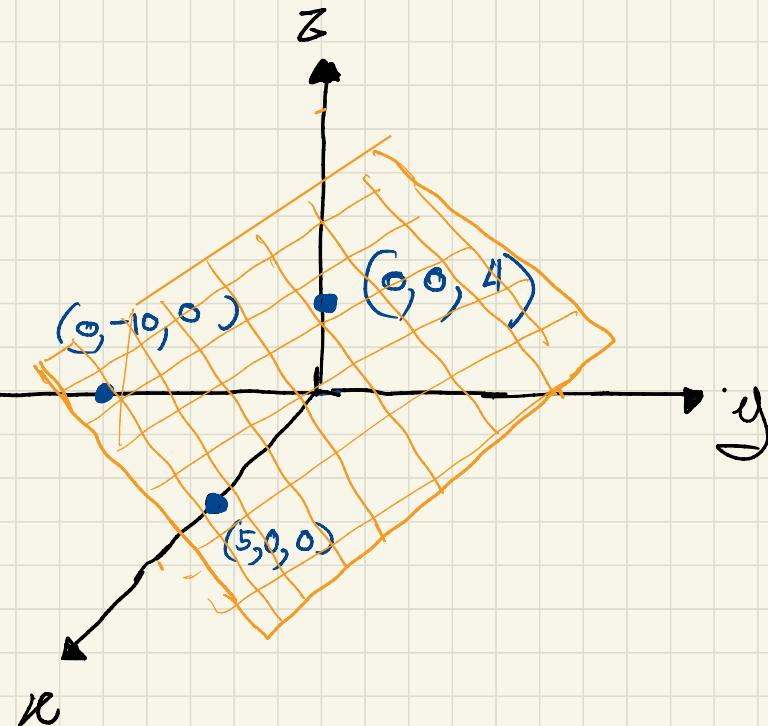
$$4x - 2y + 5z = 20 \quad \text{Durch}$$

mit x, y, z  ~~$\Rightarrow \sqrt{5}, \sqrt{6}, \sqrt{10}$~~

$$(5, 0, 0), (0, -10, 0) \quad \text{mit} =$$

$$(0, 0, 4)$$

Aus



2)  $\vec{r} = \langle -2, 3, 1 \rangle$   $\vec{n} = \langle 1, 2, 4 \rangle$  L2  
 $\vec{r} = \langle 1, 2, 4 \rangle$   $\vec{n} = \langle 1, 2, 4 \rangle$   
 $\vec{r} = \langle 1, 2, 4 \rangle$   $\vec{n} = \langle 1, 2, 4 \rangle$

**Sol:**  $\vec{r} = \langle 1, 2, 4 \rangle$   $\vec{n} = \langle 1, 2, 4 \rangle$   
 $d = ?$   $x + 2y + 4z = 8$  Ans

$x + 2y + 4z = d$  ①  
 $x + 2y + 4z = 8$  ②

$\therefore$   $(-2) + 2(3) + 4(1) = d$   
 $(-2) + 6 + 4 = d$   
 $\therefore d = 8$  \*

3)  $\text{R}^4$   $\text{dahmav} C(3, 3, 5, 2)$   $m=2$  13

$$\text{vector } \vec{n} = \langle 1, -1, 1, -1 \rangle$$

~~the dimension of  $R^4$  is 4~~

4 numbers  $w, x, y, z$  are given

equation  $w + x + y + z = d$

$$w + (-1)x + y + (-1)z = d \quad (1)$$

$(3, 1, 5, 4)$  ~~equation~~

$\therefore$  ~~equation~~  $d = 10$

$$(2) + (-1)(1) + (5) + (-1)4 = d$$

$$\therefore d = 2$$

$\therefore$  ~~equation~~ (1)

$\therefore$  ~~equation~~  $w + x + y + z = d$

$$w - x + y - z = d$$

~~equation~~