Quiz

1. $u = (3,2)$ $\quad v = (-1-0, 4-2)$
$= (-1, 2)$

$u + v = (2, 4)$

2. $\|u\| = \sqrt{3^2 + 2^2} = \sqrt{13}$ $\quad \|u\|_1 = 5$
$\|v\| = \sqrt{(-1)^2 + (2)^2} = \sqrt{5}$ $\quad \|v\|_1 = 3$
$\|u+v\| = \sqrt{2^2 + 4^2} = \sqrt{20}$ $\quad \|u+v\|_1 = 6$

$\|u\|_3 = \sqrt[3]{3^3 + 2^3} = 3.27$ $\quad \|u\|_{max} = 3$
$\|v\|_3 = \sqrt[3]{(-1)^3 + 2^3} = 1.91$ $\quad \|v\|_{max} = 2$
$\|u+v\|_3 = \sqrt[3]{2^3 + 4^3} = 4.16$ $\quad \|u+v\|_{max} = 4$

3. $u \cdot v = 3 \times -1 + 2 \times 2 = -3 + 4 = 1$

4. $$\begin{pmatrix} -3 & 2 & -5 \\ 2 & -3 & 4 \\ 1 & 1 & 1 \end{pmatrix} \begin{pmatrix} x \\ y \\ z \end{pmatrix} = \begin{pmatrix} 14 \\ 10 \\ 14 \end{pmatrix}$$

6. $C_{11} = 2 + 2 + 12 = 16$ $\quad C_{12} = -4 + 1 - 6 = -9$
$C_{21} = 3 - 4 + 4 = 3$ $\quad C_{22} = -6 - 2 - 2 = -10$
$C_{31} = -1 + 0 + 4 = 3$ $\quad C_{32} = 2 + 0 - 2 = 0$

$$C = \begin{pmatrix} 16 & -9 \\ 3 & -10 \\ 3 & 0 \end{pmatrix}$$

Exercise 2

- $v \cdot u = 2 + 12 + 5 = 19$
- $\|v\|_1 = 2+4+1 = 7$ $\quad \|u\|_1 = 1+3+5 = 9$

$\|v\|_2 = \sqrt{2^2+4^2+1^2} = 4.58$ $\quad \|u\|_2 = \sqrt{1^2+3^2+5^2} = 5.91$

$\|v\|_3 = \sqrt[3]{2^3+4^3+1^3} = 4.18$ $\quad \|u\|_3 = \sqrt[3]{1^3+3^3+5^3} = 5.35$

$\|v\|_4 = \sqrt[4]{2^4+4^4+1^4} = 4.06$ $\quad \|u\|_4 = \sqrt[4]{1^4+3^4+5^4} = 5.16$

$\|v\|_{max} = 4$ $\quad \|u\|_{max} = 5$

- $v + u = \begin{bmatrix} 3 \\ 7 \\ 6 \end{bmatrix}$

$\|v+u\|_1 = 3+7+6 = 16$

$\|v+u\|_2 = \sqrt{3^2+7^2+6^2} = 9.7$

$\|v+u\|_3 = \sqrt[3]{3^3+7^3+6^3} = 8.37$

$\|v+u\|_4 = \sqrt[4]{3^4+7^4+6^4} = 7.84$

$\|v+u\|_{max} = 7$

$v = \begin{pmatrix} 2 \\ 4 \\ 1 \end{pmatrix}$

$u = \begin{pmatrix} 1 \\ 3 \\ 5 \end{pmatrix}$

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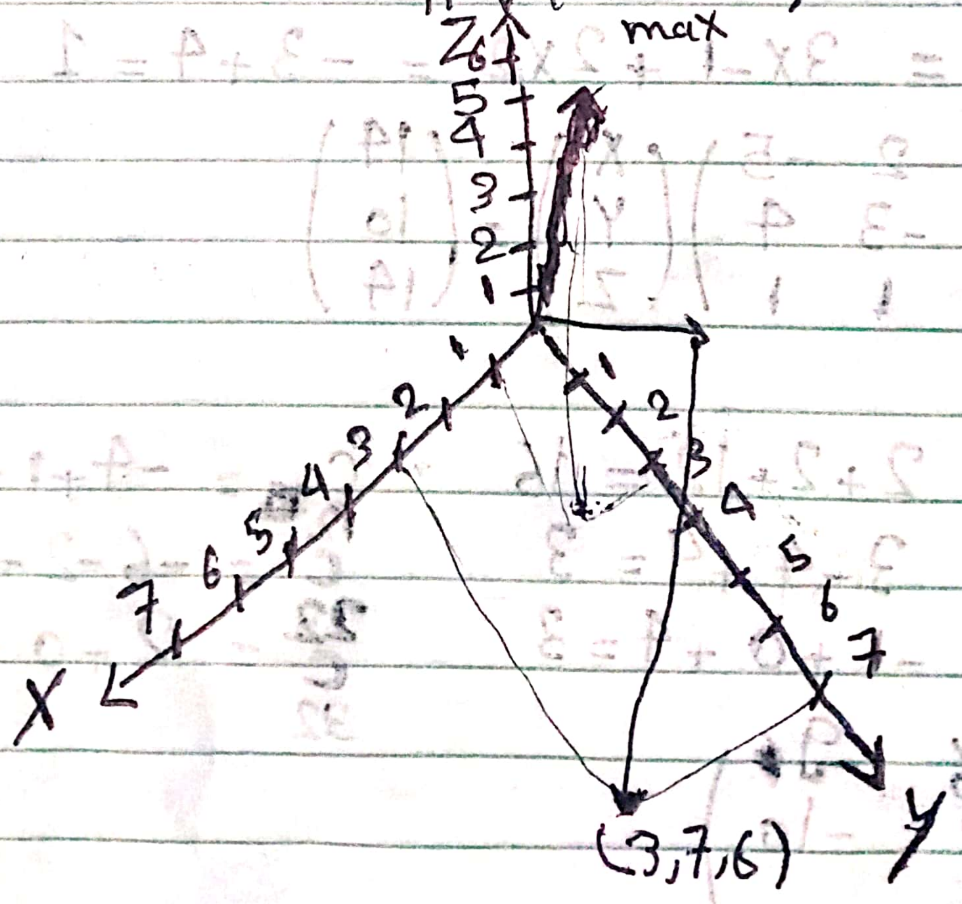

Exercise 3

1.
$$2x+3y=1$$
$$10x+9y=11$$
$$-10x-15y=-5$$

$$2x+3y=1$$
$$-6y=6$$

$\boxed{y=-1}$
$\boxed{x=2}$

$$2x-4y=6$$
$$-x+5y=0$$
$$x-2y=3$$

$$2x-4y=6$$
$$3y=3$$

$\boxed{y=1}$
$\boxed{x=5}$

$$\Longrightarrow \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$$

2.
$$\begin{pmatrix} 1 & 1 & 0 \\ 1 & 2 & 1 \\ 0 & 1 & 2 \end{pmatrix} \Longrightarrow \begin{pmatrix} 1 & 1 & 0 \\ 0 & 1 & 1 \\ 0 & 1 & 2 \end{pmatrix} \Longrightarrow \begin{pmatrix} 1 & 1 & 0 \\ 0 & 1 & 1 \\ 0 & 0 & 1 \end{pmatrix}$$

3.
$$\left(\begin{array}{ccc|c} 1 & 1 & 1 & 7 \\ 1 & 1 & -1 & 5 \\ 1 & -1 & 1 & 3 \end{array}\right) \Longrightarrow \left(\begin{array}{ccc|c} 1 & 1 & 1 & 7 \\ 0 & 0 & -2 & -2 \\ 0 & -2 & 0 & -4 \end{array}\right) \Longrightarrow$$

$$\left(\begin{array}{ccc|c} 1 & 1 & 1 & 7 \\ 0 & -2 & 0 & -4 \\ 0 & 0 & -2 & -2 \end{array}\right)$$

$\boxed{z=1}$ $\boxed{y=2}$ $\boxed{x=4}$

$$\left(\begin{array}{ccc|c} 1 & 1 & 1 & 7 \\ 1 & 1 & -1 & 5 \\ -1 & -1 & 1 & 3 \end{array}\right) \Longrightarrow \left(\begin{array}{ccc|c} 1 & 1 & 1 & 7 \\ 0 & \boxed{0} & -2 & -2 \\ 0 & 0 & 2 & 10 \end{array}\right)$$

Cannot be Zero

$\boxed{z=5}$ $\boxed{z=1}$ Multiple values of z