Quiz 2 Solutions

Problem 1:

(a) 1 linear equation in 3 unknown defines a

PLANE

(b) 2 linear equations in 3 unknowns probably defines a

LINE

(c) 3 linear equations in 3 unknowns probably defines a

POINT.

Problem 2:

(a)
$$\begin{cases} x+y+z=0 & R_1 \\ 0+y+3z=0 & R_2 \end{cases}$$

$$\begin{cases} x+0-2z=0 & R_1' = R_1 - R_2 \\ 0+y+3z=0 & R_2' = R_2 \end{cases}$$

$$\begin{pmatrix} x \\ y \\ z \end{pmatrix} = \begin{pmatrix} 2z \\ -3z \\ z \end{pmatrix} = z \begin{pmatrix} 2 \\ -3 \\ 1 \end{pmatrix} \quad \text{LINE}$$

(b) $$\begin{cases} x+y+z=0 & R_1 \\ 0+y+3z=0 & R_2 \\ x+2y+3z=1 & R_3 \end{cases}$$

R_1 & R_2 is a line $\begin{pmatrix} x \\ y \\ z \end{pmatrix} = z\begin{pmatrix} 2 \\ -3 \\ 1 \end{pmatrix}$

Intersect this line with plane R_3:

$$x+2y+3z=1$$
$$(2z)+2(-3z)+3(z)=1$$
$$2z-6z+3z=1$$
$$-z=1$$
$$z=-1.$$

The solution is a POINT:

$$\begin{pmatrix} x \\ y \\ z \end{pmatrix} = (-1)\begin{pmatrix} 2 \\ -3 \\ 1 \end{pmatrix} = \begin{pmatrix} -2 \\ 3 \\ -1 \end{pmatrix}.$$