Q1,

$$\begin{bmatrix} 3 & 4 & 2 \\ 2 & -3 & 1 \\ 5 & 7 & 1 \end{bmatrix} \qquad \begin{bmatrix} 1 & 7 & 1 \\ 0 & 17 & 1 \\ 0 & 7 & 1 \end{bmatrix}$$

$$\Rightarrow \begin{array}{l} R_1 - R_2 \\ R_2 - 2R_1 \\ R_3 - 5R_1 \end{array} \begin{bmatrix} 1 & 7 & 1 \\ 0 & -17 & -1 \\ 0 & -28 & -4 \end{bmatrix}$$

$$\begin{array}{l} \\ -R_2 \\ R_3/_{-4} \end{array} \begin{bmatrix} 1 & 7 & 1 \\ 0 & 17 & 1 \\ 0 & 7 & 1 \end{bmatrix}$$

Yes! they are row equivalent. as their elements become identical after the ERO's above.

columns.

Q2.

(i)

$$\begin{array}{c} \begin{array}{ccccc} x & y & z & w & b \end{array} \\ \left[\begin{array}{ccccc} 1 & -7 & 0 & 6 & -5 \\ 0 & 0 & 1 & -2 & -3 \\ 1 & -7 & 4 & -2 & -6 \end{array}\right] \end{array}$$

$$\left[\begin{array}{ccccc} 1 & -7 & 0 & 6 & -5 \\ 1 & -7 & 4 & -2 & -6 \\ 0 & 0 & 1 & -2 & -3 \end{array}\right]$$

$R_2 - R_1$

$$\left[\begin{array}{ccccc} 1 & -7 & 0 & 6 & -5 \\ 0 & 0 & 4 & -8 & -1 \\ 0 & 0 & 1 & -2 & -3 \end{array}\right]$$

$$\begin{array}{r c} & \\ R_2 - 4R_3 & \\ & \end{array}\begin{bmatrix} 1 & -7 & 0 & 6 & -5 \\ 0 & 0 & 0 & 0 & 11 \\ 0 & 0 & 1 & -2 & -3 \end{bmatrix}$$

$\Rightarrow$ No solution as second leading 1 is zero. or $0 \neq 11$

inconsistent

(ii)

$$\begin{array}{cccccc} x_1 & x_2 & x_3 & x_4 & x_5 & b \end{array}$$

$$\begin{bmatrix} 0 & 3 & -6 & 6 & 4 & -5 \\ 3 & -7 & 8 & -5 & 8 & 9 \\ 3 & -9 & 12 & -9 & 6 & 15 \end{bmatrix}$$

$$\begin{bmatrix} 3 & -7 & 8 & -5 & 8 & 9 \\ 0 & 3 & -6 & 6 & 4 & -5 \\ 0 & -12 & 6 & -15 & 2 & 20 \end{bmatrix} \times$$

$R_3 - R_1$ updated

$$\begin{array}{r} \\ R_2 - R_1 \text{ updated} \\ \\ \end{array}\begin{bmatrix} 3 & -9 & 12 & -9 & 6 & 15 \\ 0 & 2 & -4 & 4 & 2 & -6 \\ 0 & 3 & -6 & 6 & 4 & -5 \end{bmatrix}$$

$$\begin{bmatrix} 3 & -9 & 12 & -9 & 6 & 15 \\ 0 & 2 & -4 & 4 & 2 & -6 \\ 0 & 3 & -6 & 6 & 4 & -5 \end{bmatrix}$$

$$\begin{array}{l} R_1/3 \\ R_2-R_3 \\ R_3+3R_2 \text{ updated} \end{array} \begin{bmatrix} 1 & -3 & 4 & -3 & 2 & 5 \\ 0 & -1 & 2 & -2 & -2 & -1 \\ 0 & 0 & 0 & 0 & -2 & -8 \end{bmatrix}$$

$$\begin{array}{l} \text{updated } R_1+3R_2 \\ -R_2 \\ \\ \end{array} \begin{bmatrix} 1 & 0 & -2 & 3 & 8 & 8 \\ 0 & 1 & -2 & 2 & 2 & 1 \\ 0 & 0 & 0 & 0 & -2 & -8 \end{bmatrix}$$

⇒ ~~No solution, in R_3 no leading 1 left but a constant value.~~

$$x_1 - 2x_3 + 3x_4 + 8x_5 = 8$$
$$x_2 - 2x_3 + 2x_4 + 2x_5 = 1$$
$$-2x_5 = -8$$
$$\boxed{x_5 = 4}$$

Inconsistence unique solution.

(iii) ~~[incomplete]~~

$$
\begin{array}{cccc}
x & y & z & b
\end{array}
$$

$$
\left[\begin{array}{ccc:c}
35 & 6 & -7 & 15 \\
90 & 15 & -21 & 40 \\
25 & 3 & -7 & 11
\end{array}\right]
$$

$R_1 - R_3$

$\Rightarrow$

$R_2/3$

$$
\left[\begin{array}{cccc}
10 & 3 & 0 & 4 \\
30 & 5 & -7 & 40/3 \\
25 & 3 & -7 & 11
\end{array}\right]
$$

$R_1/10$

$\Rightarrow$

$R_2 - 3R1$

$$
\left[\begin{array}{cccc}
1 & 3/10 & 0 & 4/10 \\
0 & -10 & -7 & 4/3 \\
5 & -3 & -7 & 3
\end{array}\right]
$$

$R_3 - 2R1$

$\cancel{10}R_2/-10$

$$
\left[\begin{array}{cccc}
1 & 3/10 & 0 & 4/10 \\
0 & 1 & 7/10 & 2/15 \\
0 & -9/2 & -7 & 1
\end{array}\right]
$$

$R_3 - 5R1$

$10R_1$

$$
\left[\begin{array}{cccc}
10 & 3 & 0 & 4 \\
0 & 1 & 7/10 & 2/15 \\
0 & -9 & -14 & 2
\end{array}\right]
$$

$2R_3$

$$\begin{bmatrix} 10 & 3 & 0 & 4 \\ 0 & 1 & 7/10 & 2/15 \\ 0 & -9 & -14 & 2 \end{bmatrix}$$

$$\begin{array}{c} R_1 - 3R_2 \\ \\ R_3 + 9R_2 \end{array} \begin{bmatrix} 10 & 0 & -21/10 & 18/5 \\ 0 & 1 & 7/10 & 2/15 \\ 0 & 0 & -77/10 & 16/5 \end{bmatrix}$$

$\boxed{\text{incomplete}}$

$$\begin{array}{c} R_1/10 \\ \\ R_3/(-77/10) \end{array} \begin{bmatrix} 1 & 0 & -21/100 & 9/25 \\ 0 & 1 & 7/10 & 2/15 \\ 0 & 0 & 1 & -32/77 \end{bmatrix}$$

$$\begin{array}{c} R_1 + \frac{21}{100} R_3 \\ R_2 - \frac{7}{10} R_3 \\ \\ \end{array} \begin{bmatrix} 1 & 0 & 0 & 3/11 \\ 0 & 1 & 0 & 14/33 \\ 0 & 0 & 1 & -32/77 \end{bmatrix}$$

$x = 3/11$

$y = 14/33$

$z = -32/77$

Q3.

(i)

$$\begin{bmatrix} 1 & -4 & 7 & g \\ 0 & 3 & -5 & h \\ -2 & 5 & -9 & k \end{bmatrix}$$

$$\begin{array}{r} \\ R_2 + R_3 \text{ updated} \\ R_3 + 2R_1 \end{array} \begin{bmatrix} 1 & -4 & 7 & g \\ 0 & 0 & 0 & 2g+h+k \\ 0 & -3 & 5 & k+2g \end{bmatrix}$$

$$\begin{bmatrix} 1 & -4 & 7 & g \\ 0 & -3 & 5 & k+2g \\ 0 & 0 & 0 & 2g+k+h \end{bmatrix}$$

$$\boxed{2g + k + h = 0}$$

(ii)

$$\left[\begin{array}{cc:c} 1 & 3 & a \\ c & d & b \end{array}\right]$$

~~c & $d \neq -3$~~

- ~~if c & d become -3 then the solution would be infinite or no solution.~~

- For a consistent and unique solution $c = 0$ & $d = 1$ should be the values.

Q4.

(i)

$$\begin{array}{c} \\ \\ \\ \end{array}\begin{array}{cccc} x & y & z & b \end{array}$$

$$\begin{bmatrix} 3 & 1 & 0 & 6 \\ 5 & 1 & 1 & 6 \\ 3 & 0 & 1 & 1 \end{bmatrix}$$

$$\begin{array}{c} R_1 - R_3 \\ R_2 - R_3 \\ R_3 - R_2 \text{ update} \end{array} \begin{bmatrix} 0 & 1 & -1 & 5 \\ 2 & 1 & 0 & 5 \\ 1 & -1 & 1 & -4 \end{bmatrix}$$

$$\begin{array}{c} \\ R_2 - 2R_1 \text{ update} \\ \\ \end{array} \begin{bmatrix} 1 & -1 & 1 & -4 \\ 0 & 3 & -2 & 13 \\ 0 & 1 & -1 & 5 \end{bmatrix}$$

$$\begin{array}{c} R_1 - R_3 \\ R_2 - 2R_3 \\ R_3 - R_2 \text{ update} \end{array} \begin{bmatrix} 1 & 0 & 0 & -9 \\ 0 & 1 & 0 & 3 \\ 0 & 0 & -1 & 2 \end{bmatrix}$$

$$\begin{array}{c} \\ \Rightarrow \\ -R_3 \end{array} \begin{bmatrix} 1 & 0 & 0 & -9 \\ 0 & 1 & 0 & 3 \\ 0 & 0 & 1 & -2 \end{bmatrix}$$

$x = -9$, $y = 3$, $z = -2$

point in common is,

$(-9, 3, -2)$

- (ii)

$$\begin{array}{c} \begin{array}{ccc} x & y & b \end{array} \\ \begin{bmatrix} 1 & a & 2 \\ 4 & 8 & \beta \end{bmatrix} \end{array}$$

$$R_2 - 4R_1 \quad \begin{bmatrix} 1 & a & 2 \\ 0 & 8-4a & \beta - 8 \end{bmatrix}$$

* Remaining

Q4.

(ii)

$$\begin{array}{ccc} x & y & B \\ \end{array}$$
$$\begin{bmatrix} 1 & a & 2 \\ 4 & 8 & B \end{bmatrix}$$

$$\Rightarrow \begin{bmatrix} 1 & a & 2 \\ 0 & 8-4a & B \end{bmatrix}$$

$R_2 - 4R_1$

(a) No Solution

$8 - 4a = 0$

$8 = 4a$

$a = 2$

$$\boxed{\cancel{\begin{array}{l} 8 - 4a > a \\ 8 > 5a \\ a > \frac{8}{5} \end{array}}}$$

$a = 2$, $b \neq 2$

(b) Unique solution

$$8 - 4a = 1$$

$$8 - 1 = 4a$$

$$\frac{7}{4} = a$$

$$a = 7/4 \quad , \quad \beta = Z$$

any ~~integer~~ Real number

(c) Infinitely many solution

$$a = 2 \quad , \quad b = 2$$

as,

$$\boxed{\begin{aligned} 8 - 4a &= 0 \\ a &= 2 \end{aligned}}$$

Q5,

(i)

$$\begin{array}{c} \\ \\ \\ \end{array}\begin{array}{cccc} x & y & z & b \end{array}$$

$$\left[\begin{array}{cccc} 1 & 2 & -3 & 4 \\ 3 & -1 & 3 & 1 \\ 4 & 1 & a^2-2 & a+4 \end{array}\right]$$

$$\Rightarrow \begin{array}{l} \\ R_2 - 3R_1 \\ R_3 - 4R_1 \end{array}\left[\begin{array}{cccc} 1 & 2 & -3 & 4 \\ 0 & -7 & 12 & -11 \\ 0 & -7 & a^2-20 & a-12 \end{array}\right]$$

$$\begin{array}{l} \\ \\ R_3 - R_2 \end{array}\left[\begin{array}{cccc} 1 & 2 & -3 & 4 \\ 0 & -7 & 12 & -11 \\ 0 & 0 & a^2-22 & a-1 \end{array}\right]$$

$(a+4) - 4(4)$ $\quad (a^2-2) - 4(-3)$

$a+4-16$ $\quad (a^2-2)+12 \Rightarrow a^2+10$

$a-12$

(i) no solution

$$a^2 - 22 = 0$$
$$a^2 = 22$$
$$\sqrt{a} = \sqrt{22} \Rightarrow a = \sqrt{22}$$

(ii) Unique solution

$$a^2 - 22 = 1$$
$$a^2 = 23$$
$$a = \sqrt{23}$$

(iii) infinitely many solutions

$$a^2 - 22 = a - 1$$
$$a^2 - a - 21 = 0$$

$\boxed{a=1,\ b=-1,\ c=-21}$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\Rightarrow \frac{+1 \pm \sqrt{(-1)^2 - 4(1)(-21)}}{2}$$

$$\Rightarrow \frac{1 \pm \sqrt{85}}{2}$$

$$a^2 - 22 = a - 1$$

$$a^2 = a + 21$$

$$a = \sqrt{a+21}$$

(ii)

$$\begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix} x - \begin{bmatrix} 1 & 4 \\ 2 & 0 \end{bmatrix} x = \begin{bmatrix} 2 & -2 \\ 5 & 4 \end{bmatrix}$$

$$\Rightarrow \begin{bmatrix} 3-1 & 1-4 \\ -1-2 & 2-0 \end{bmatrix}$$

$$\Rightarrow \begin{bmatrix} 2 & -3 \\ -3 & 2 \end{bmatrix} x = \begin{bmatrix} 2 & -2 \\ 5 & 4 \end{bmatrix}$$

$\downarrow$

inverse :

$$R_1 - R_2 \quad \begin{bmatrix} -1 & -1 \\ -3 & 2 \end{bmatrix} \begin{bmatrix} 1 & -1 \\ 0 & 1 \end{bmatrix}$$

$$\begin{matrix} -R_1 \\ R_2 + 3R_1 \end{matrix} \quad \begin{bmatrix} 1 & 1 \\ 0 & 5 \end{bmatrix} \begin{bmatrix} -1 & 1 \\ -3 & 4 \end{bmatrix}$$

$$\Rightarrow \left[\begin{array}{cc|cc} 1 & 1 & -1 & 1 \\ 0 & 5 & -3 & 4 \end{array}\right]$$

$$\begin{array}{l} R_1 - R_2 \\ R_2/5 \end{array} \left[\begin{array}{cccc} 1 & 0 & -2/5 & 1/5 \\ 0 & 1 & -3/5 & 4/5 \end{array}\right]$$

$$\Rightarrow \begin{bmatrix} -2/5 & 1/5 \\ -3/5 & 4/5 \end{bmatrix}$$

Sol:

$$\begin{bmatrix} -2/5 & 1/5 \\ -3/5 & 4/5 \end{bmatrix} \left[\begin{array}{c|c} 2 & -2 \\ 5 & 4 \end{array}\right]$$

$$\Rightarrow \begin{bmatrix} (-2/5 \times 2) + 1 & \cancel{(-3/5 \times 2) + (4/5 \times 4)} \quad (-3/5 \times 2) + (4) \\ (+2/5 \times 2) + (\frac{1}{5} \times 4) & (+3/5 \times 2) + (4/5 \times 4) \end{bmatrix}$$

$$\Rightarrow \begin{bmatrix} 1/5 & 14/5 \\ 8/5 & 22/5 \end{bmatrix} \text{ Ans.}$$

Q6,

(i)

$$\begin{bmatrix} -1 & -3 & 0 & 1 \\ 3 & 5 & 8 & -3 \\ -2 & -6 & 3 & 2 \\ 0 & -1 & 2 & 1 \end{bmatrix}$$

$$\begin{array}{l} -R_1 \\ R_2 - 3R_1 \\ P\ R_3 + 2R_1 \\ \\ \end{array} \begin{bmatrix} 1 & 3 & 0 & -1 \\ 0 & -4 & 8 & 0 \\ 0 & 0 & 3 & 0 \\ 0 & -1 & 2 & 1 \end{bmatrix}$$

$$\begin{array}{l} R_1 + 3R_4 \\ -R_2 + R_1 \\ \\ R_4 + R_2 \text{ update} \end{array} \begin{bmatrix} 1 & 0 & 6 & 2 \\ 0 & 1 & -8 & 1 \\ 0 & 0 & 3 & 0 \\ 0 & 0 & -6 & 2 \end{bmatrix}$$

$$\begin{array}{l} R_1 - 6R_3 \\ R_2 + 8R_3 \\ R_3/3 \\ R_4 + 6R_3 \end{array} \begin{bmatrix} 1 & 0 & 0 & 2 \\ 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 2 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 0 & 0 & 2 \\ 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 2 \end{bmatrix}$$

$$\begin{array}{l} R_1 - 2R_4 \rightarrow \\ R_2 - R_4 \rightarrow \\ \\ R_4/2 \rightarrow \end{array} \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

⇒ Matrix is invertible as it have a Reduce echelon form with unique solutions.

(ii)

$$\begin{array}{c} \\ \\ \\ \\ \end{array}\begin{array}{cccccc} x_1 & x_2 & x_3 & & & \\ \end{array}$$

$$\left[\begin{array}{ccc|ccc} 5 & 3 & 2 & 1 & 0 & 0 \\ 3 & 3 & 2 & 0 & 1 & 0 \\ 0 & 1 & 1 & 0 & 0 & 1 \end{array}\right]$$

$$\begin{array}{l} R_1 - R_2 \\ R_2 - R_1 \text{ update} \\ \\ \end{array}\left[\begin{array}{cccccc} 2 & 0 & 0 & 1 & -1 & 0 \\ 1 & 3 & 2 & 0 & 2 & 0 \\ 0 & 1 & 1 & 0 & 0 & 1 \end{array}\right]$$

$$\left[\begin{array}{cccccc} 1 & 3 & 2 & 1 & -1 & 0 \\ 0 & 1 & 1 & 0 & 0 & 1 \\ 2 & 0 & 0 & 1 & -1 & 0 \end{array}\right]$$

$$\begin{array}{l} R_1 - 3R_2 \\ \\ R_3 - 2R_1 \end{array}\left[\begin{array}{cccccc} 1 & 0 & -1 & 1 & -1 & -3 \\ 0 & 1 & 1 & 0 & 0 & 1 \\ 0 & -6 & -4 & -1 & 1 & 0 \end{array}\right]$$

$$\begin{array}{l} \\ \\ R_3 + 6R_2 \end{array}\left[\begin{array}{cccccc} 1 & 0 & -1 & 1 & -1 & -3 \\ 0 & 1 & 1 & 0 & 0 & 1 \\ 0 & 0 & 2 & -1 & 1 & 6 \end{array}\right]$$

$$\begin{array}{l} R_1 + R_3 \\ (\text{up})\ R_2 - R_3 \\ R_3/2 \end{array}\left[\begin{array}{cccccc} 1 & 0 & 0 & 1/2 & 1/2 & 0 \\ 0 & 1 & 0 & 1/2 & -1/2 & -2 \\ 0 & 0 & 1 & -1/2 & 1/2 & 3 \end{array}\right]$$

inverse :

$$\begin{bmatrix} 1/2 & 1/2 & 0 \\ 1/2 & -1/2 & -2 \\ -1/2 & 1/2 & 3 \end{bmatrix}$$

Sol:

$$\begin{bmatrix} 1/2 & 1/2 & 0 \\ 1/2 & -1/2 & -2 \\ -1/2 & 1/2 & 3 \end{bmatrix} \begin{bmatrix} 4 \\ 2 \\ 5 \end{bmatrix}$$

$$3 \times \boxed{3 \quad 3} \times 1$$

$$= \begin{bmatrix} 2 + 1 + 0 \\ 2 - 1 - 16 \\ -2 + 1 + 15 \end{bmatrix}$$

$$\Rightarrow \begin{bmatrix} 3 \\ -9 \\ 14 \end{bmatrix} \begin{matrix} \to x_1 \\ \to x_2 \\ \to x_3 \end{matrix} \quad \text{Ans}$$

(iii)

$$\begin{array}{c} \begin{array}{cccccc} z_1 & z_2 & z_3 & z_4 & z_5 & b \end{array} \\ \left[\begin{array}{ccccc:c} 0 & 0 & 1 & 1 & 1 & 0 \\ -1 & -1 & 2 & -3 & 1 & 0 \\ 1 & 1 & -2 & 0 & -1 & 0 \\ 2 & 2 & -1 & 0 & 1 & 0 \end{array}\right] \end{array}$$

$$\begin{array}{l} \\ R_2+R_1 \\ R_3-R_1 \\ R_4-2R_1 \end{array} \begin{bmatrix} 1 & 1 & -2 & 0 & -1 & 0 \\ 0 & 0 & 0 & -3 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 3 & 0 & 3 & 0 \end{bmatrix}$$

⇒ ~~This matrix have no solution.~~

$$\begin{bmatrix} 1 & 1 & -2 & 0 & -1 & 0 \\ 0 & 0 & 0 & -3 & 0 & 0 \\ 0 & 0 & 3 & 0 & 3 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

⇒ The matrix have no solution. as ~~see~~ there is no second leading 1.

Q 7,

(i)

$$\left[\begin{array}{ccc|ccc} 1 & 0 & -2 & 1 & 0 & 0 \\ 3 & 1 & -2 & 0 & 1 & 0 \\ -5 & -2 & 3 & 0 & 0 & 1 \end{array}\right]$$

$\Rightarrow$

$$\begin{array}{l} \\ R_2 - 3R_1 \\ R_3 + 5R_1 \end{array} \left[\begin{array}{ccc|ccc} 1 & 0 & -2 & 1 & 0 & 0 \\ 0 & 1 & 4 & -3 & 1 & 0 \\ 0 & -2 & -7 & 5 & 0 & 1 \end{array}\right]$$

$$\begin{array}{l} R_1 + 2R_3 \\ R_2 - 4R_3 \\ R_3 + 2R_2 \end{array} \left[\begin{array}{ccc|ccc} 1 & 0 & 0 & -1 & 4 & 2 \\ 0 & 1 & 0 & 1 & -7 & -4 \\ 0 & 0 & 1 & -1 & 2 & 1 \end{array}\right]$$

inverse :

$$\begin{bmatrix} -1 & 4 & 2 \\ 1 & -7 & -4 \\ -1 & 2 & 1 \end{bmatrix}$$

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(ii)

$$\left[\begin{array}{ccc|ccc} -2 & -7 & -9 & 1 & 0 & 0 \\ 2 & 5 & 6 & 0 & 1 & 0 \\ 1 & 3 & 4 & 0 & 0 & 1 \end{array}\right]$$

$\Rightarrow$

$$\begin{array}{l} R_1+R_2 \\ R_2-2R_3 \\ \\ \end{array} \begin{bmatrix} 0 & -2 & -3 & 1 & 1 & 0 \\ 0 & -1 & -2 & 0 & 1 & -2 \\ 1 & 3 & 4 & 0 & 0 & 1 \end{bmatrix}$$

$\Rightarrow$

$$\begin{bmatrix} 1 & 3 & 4 & 0 & 0 & 1 \\ 0 & -2 & -3 & 1 & 1 & 0 \\ 0 & -1 & -2 & 0 & 1 & -2 \end{bmatrix}$$

$$\begin{array}{l} R_1-3R_2 \\ -R_2 \\ R_3+2R_2 \end{array} \begin{bmatrix} 1 & 0 & -2 & 0 & 3 & -5 \\ 0 & 1 & 2 & 0 & -1 & 2 \\ 0 & 0 & 1 & 1 & -1 & 4 \end{bmatrix}$$

$$\begin{array}{l} R_1+2R_3 \\ R_2-2R_3 \\ \\ \end{array} \begin{bmatrix} 1 & 0 & 0 & 2 & 1 & 3 \\ 0 & 1 & 0 & -2 & 1 & -6 \\ 0 & 0 & 1 & 1 & -1 & 4 \end{bmatrix}$$

inverse :

$$\begin{bmatrix} 2 & 1 & 3 \\ -2 & 1 & -6 \\ 1 & -1 & 4 \end{bmatrix}$$

Q 6.

$$A \Rightarrow \begin{array}{c} \begin{array}{cccccc} x & y & z & b_1 & b_2 & b_3 \end{array} \\ \left[\begin{array}{ccc:ccc} 1 & 3 & 2 & 1 & 0 & 0 \\ 4 & -1 & 3 & 0 & 1 & 0 \\ 2 & 1 & 1 & 0 & 0 & 1 \end{array}\right] \end{array}$$

$$\Rightarrow \left[\begin{array}{cccccc} 1 & 3 & 2 & 1 & 0 & 0 \\ 0 & -13 & -5 & -4 & 1 & 0 \\ 0 & -5 & -3 & -2 & 0 & 1 \end{array}\right] \begin{array}{l} \\ R_2 - 4R_1 \\ R_3 - 2R_1 \end{array}$$

$$\left[\begin{array}{cccccc} 1 & 3 & 2 & 1 & 0 & 0 \\ 0 & -3 & 1 & 0 & 1 & -2 \\ 0 & -2 & -4 & -2 & \cancel{4}\ -1 & 3 \end{array}\right] \begin{array}{l} \\ R_2 - 2R_3 \\ R_3 - R_2 \text{ update} \end{array}$$

$$\left[\begin{array}{cccccc} 1 & 0 & 17 & 7 & 6 & 3 \\ 0 & 1 & -5 & -2 & -2 & -1 \\ 0 & 2 & 4 & 2 & 1 & 3 \end{array}\right] \begin{array}{l} R_1 - 3R_2 \\ -R_2 - R_3 \\ -R_3 \end{array}$$

$$\left[\begin{array}{cccccc} 1 & 0 & 17 & 7 & 6 & 3 \\ 0 & 1 & -5 & -2 & -2 & -1 \\ 0 & 0 & 14 & 6 & 5 & 5 \end{array}\right] \begin{array}{l} \\ \\ R_3 - 2R_2 \end{array}$$

CamScanner

$-2+5\left(\frac{6}{14}\right)$

$$\begin{array}{l} R_1 - 17R_3 \rightarrow \\ R_2 + 5R_3 \rightarrow \\ R_3/14 \rightarrow \end{array} \begin{bmatrix} 1 & 0 & 0 & -2/7 & -1/14 & -43/14 \\ 0 & 1 & 0 & 1/7 & -3/14 & 11/14 \\ 0 & 0 & 1 & 6/14 & 5/14 & 5/14 \end{bmatrix}$$

$x_1 = -2/7 \,,\ -1/14 \,,\ -43/14$

$x_2 = 1/7 \,,\ -3/14 \,,\ 11/14$

$x_3 = \cancel{6}^{3}/\cancel{14}_{7} \Rightarrow \frac{3}{7} \,,\ \frac{5}{14} \,,\ \frac{5}{14}$