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## Gaussian Elimination

Solve 2x+4y+2z=92x+4y-3z=1

3x+6y-52=0

lay Gaussian elimination and backsubstitution.

## Solution:

The augmented matrix for the system is

Add-2 times the first now to the second and add-3 times the first now to the third to obtain

Multiply the second now by 2 to obtain

$$\frac{\gamma_{2}' \rightarrow \gamma_{2}/2}{0.1 + \gamma_{2}} = \begin{bmatrix} 1 & 1 & 2 & 9 \\ 0 & 1 & -\gamma_{2} & 1 & -\gamma_{2} \\ 0 & 3 & -11 & -27 \end{bmatrix}$$

Add -3 times the second now to the third to oldie  $r_{3\rightarrow r_{3}+\frac{(3)r_{3}}{3}}$  [1 | 2 | 9] 0 1-7/2 | -17/2 0 0-1/2 | -3/2

Multiply the third row by -2 to obtain

which is in row-echelon form. Therefore the system corresponding to this madrix is

Solving for the leading variable yields

$$\chi = 9 - 4 - 22$$

$$y = -17/2 + 7/27$$

$$z = 3$$

Substituting the bottom equation into those above yields

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

and substituting the second equation into the top yields

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## Grauss-Jordan Elimination

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Solve

$$74+312-213$$
  $+215=0$   
 $214+612-513-214+415-316=-1$   
 $513+1014+1516=5$   
 $211+612+814+415+1816=6$ 

Solution! The augmented matrix for the given system is

Adding -2 times the first row to the second and fourth

$$\begin{bmatrix} 1 & 3 & -2 & 0 & 2 & 0 & 0 \\ 0 & 0 & -1 & -2 & 0 & -3 & -1 \\ 0 & 0 & 5 & 10 & 0 & 15 & 5 \\ 0 & 0 & 4 & 8 & 0 & 18 & 6 \end{bmatrix}$$

Multiplying the second row by -1 gives

Adding -5 times the second row to the third rows.

times the second row to the fourth row gives

Interchanging the third and fourth rocus and then multiplying the third row of the resulting matrix by to gives the row - echelon form

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Adding—3 times the third row to the second row and then adding a times the second row of the resulting matrix to the first row yields the reduced now-echelon form

The corresponding system of equation is  $\chi_{+3\chi_{2}+4\chi_{4}+2\chi_{5}=0}$ 

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The assign the free variables x2, x4 and x5 arbitrary values r, s, and t respectively, the general solutions is given by the formulas

4--38-45-2t, 72=8, N3=-25, X4=5, X5=t, N63

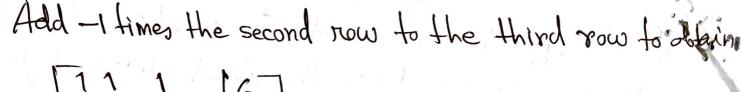
problem: Determine the value of parameters such that the following system has (i) no solution (ii) a unique solution (iii) more than one solution.

(1) 
$$7x+y+2=6$$
  
 $7x+2y+37=10$   
 $7x+2y+22=11$ 

Solution:

The augmented matrix bor the given system

Add -1 times the first now to the second & third now



Case 1: If 
$$1 \pm 3$$
, then a unique solution exist.

i.e one free variable

Therefore more than one solution exist.

Case III: if 2=3 & #= 11+10, then the system is inconsistent and there is no solution.

71+24 +32 =2.

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

$$2x + 2y - 2 = -2$$