## Homework 6 Math 100

1- Acknowledgment Statement: Please write the following statement as the answer to Exercise 1 and place your signature right below the statement.

"I acknowledge that it is my responsibility to carefully read the class notes before attempting the homework problems. I understand that what is in the class notes is the minimum I should know, and I should not expect to pass this course if I do not fully understand the material covered in the class notes."

2- Restate each problem using a matrix equation, and then answer the problem using the procedure discussed in class for ad-

2-1) Is Span{[1], [3]} = R2? [1] method [0] Piviot colons in every row so true so [1], [3] spor of R2

} = R3? [ 2 0 ] method [ 0 0] Not pivot column in every row so Not true [ ] [ 0 ] Not espendig

 $= \mathbb{R}^{3?} \begin{bmatrix} 1 & 2 & 3 \\ 2 & 3 & 5 \\ 1 & -1 & 0 \end{bmatrix} \xrightarrow{\text{metho}} \begin{bmatrix} 0 & 0 & 1 \\ 0 & 0 & 1 \\ 0 & 0 & 0 \end{bmatrix} \text{ Not pivot column in every four } \begin{bmatrix} 0 & 0 & 1 \\ 0 & 0 & 1 \\ 0 & 0 & 0 \end{bmatrix} \text{ So } \begin{bmatrix} 1 & 1 & 1 \\ 2 & 1 & 1 \end{bmatrix} \begin{bmatrix} 2 & 3 \\ 5 & 1 \end{bmatrix} \text{ and Spen of } \mathbb{R}^{2}$ 

Hint: Recall that the question "Is Span $\{a_1, \dots, a_n\} = \mathbb{R}^m$ ?" can be restated using a matrix equation as follows: Let  $A = [a_1 \cdots a_n]$ . Does Ax = b have a solution for EVERY vector b in  $\mathbb{R}^m$ ?

free - Kz, Xs 3- Suppose 

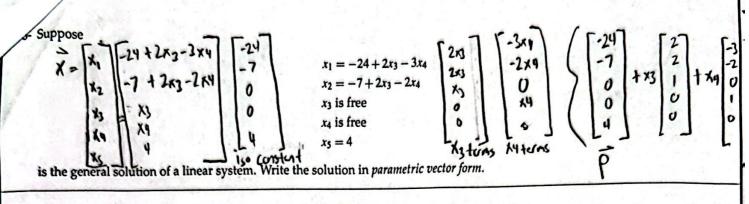
is the general solution of a linear system. Write the solution in parametric vector form.

4- Suppose

is the general solution of a linear system. Write the solution in parametric vector form.

5- Suppose

is the general solution of a linear system. Write the solution in parametric vector form.



7- Write the solution set of the given homogeneous system in parametric vector form.

$$x_1 + 2x_2 - 3x_3 = 0$$
$$2x_1 + x_2 - 3x_3 = 0$$
$$-1x_1 + x_2 = 0$$

8- Describe the solutions of the following system in parametric vector form, and provide a geometric comparison with the solution set in Exercise 7.

$$x_1 + 2x_2 - 3x_3 = 5$$

$$2x_1 + x_2 - 3x_3 = 13$$

$$-x_1 + x_2 = -8$$

9-1) Write the solution of  $x_1 + 9x_2 - 4x_3 = 0$  in parametric vector form.

9-2) Write the solution of  $x_1 + 9x_2 - 4x_3 = -2$  in parametric vector form, and provide a geometric comparison with the solution set in part (1)

$$\vec{X} = \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = \begin{bmatrix} 9x_2 + 4x_3 \\ x_2 \\ x_3 \end{bmatrix} \begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix} \begin{bmatrix} -9x_2 + 4x_3 \\ 0 \\ 0 \end{bmatrix} \begin{bmatrix} -9x_2 \\ 0 \\ 0 \end{bmatrix} \begin{bmatrix} -9$$

9-2 
$$x_1 + 9x_2 - 4x_3 = -2$$
 [D9-4-2] basic variable =  $x_1$  RHS # pivot Column so system consistent

 $x_1 = -2 - 9x_2 + 4x_3$ 

Free variable =  $x_2$  1x at least one free variable so infinite sol

$$\begin{array}{c}
\overrightarrow{X} = \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = \begin{bmatrix} -2 - 9 \times 2 + 4 \times 3 \\ x_2 \\ x_3 \end{bmatrix} \begin{bmatrix} -2 \\ 0 \\ 0 \end{bmatrix} \begin{bmatrix} -4 \times 2 \\ 0 \\ 0 \end{bmatrix} \begin{bmatrix} -4 \times 2 \\ 0 \\ 0 \end{bmatrix} = \begin{bmatrix} 4 \times 3 \\ 0 \\ 0 \end{bmatrix} = \begin{bmatrix} 4 \times 3 \\ 0 \\ 0 \end{bmatrix} + X_2 \begin{bmatrix} 9 \\ 0 \\ 0 \end{bmatrix} + X_3 \begin{bmatrix} 4 \\ 0 \\ 0 \end{bmatrix} \\
\text{Geometric Description} \quad \text{constants involve } x_2 \\
\end{array}$$

9.1 is a homogenous equation & we obtain 9-2 by adding vector p, by adding vector p we shift the plane by vector p & new shifted planewill be parrall to original plane.