

Assignment-II

- 1 What multiple ℓ of equation 1 should be subtracted from equation 2 to remove c ?

$$ax + by = f$$

$$cx + dy = g.$$

The first pivot is a (assumed nonzero). Elimination produces what formula for the second pivot? What is y ? The second pivot is missing when $ad = bc$: singular.

- 2 Choose a right side which gives no solution and another right side which gives infinitely many solutions. What are two of those solutions?

Singular system

$$3x + 2y = 10$$

$$6x + 4y =$$

- 3 (Recommended) A system of linear equations can't have exactly two solutions. *Why?*
- (a) If (x, y, z) and (X, Y, Z) are two solutions, what is another solution?
 - (b) If 25 planes meet at two points, where else do they meet?
- 4 If the last corner entry is $A(5, 5) = 11$ and the last pivot of A is $U(5, 5) = 4$, what different entry $A(5, 5)$ would have made A singular?
- 5 Start with 100 equations $Ax = 0$ for 100 unknowns $x = (x_1, \dots, x_{100})$. Suppose elimination reduces the 100th equation to $0 = 0$, so the system is "singular".
- (a) Elimination takes linear combinations of the rows. So this singular system has the singular property: Some linear combination of the 100 **rows** is _____.
 - (b) Singular systems $Ax = 0$ have infinitely many solutions. This means that some linear combination of the 100 **columns** is _____.
 - (c) Invent a 100 by 100 singular matrix with no zero entries.
 - (d) For your matrix, describe in words the row picture and the column picture of $Ax = 0$. Not necessary to draw 100-dimensional space.