

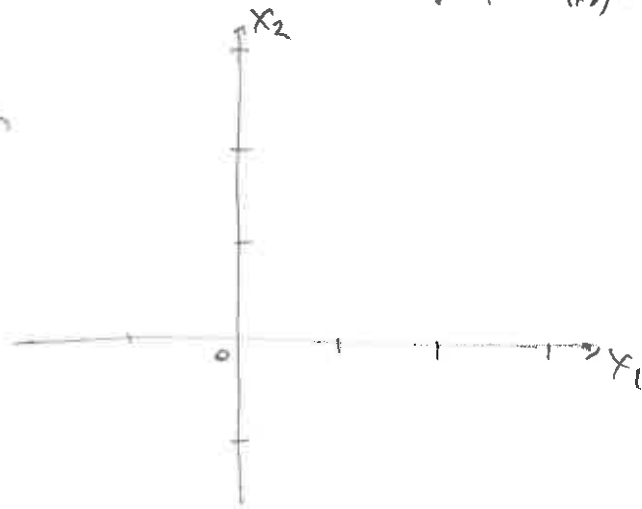
MATH 22 WORKSHEET : Solution sets of linear systems.

9/12/16
Barnett

each point is a pair (x_1, x_2)

Say equation (a) is $x_1 + x_2 = 2$

- plot the object defined by this single equation in 2D space (think of x_1 as "x axis" & x_2 as "y axis"). Use axes to the right.



Equation (b) is $-x_1 + x_2 = 0$

- add the object defined by (b) to your plot, label it.
- How many points in the solution set to the system (a) & (b)? List them:

Imagine (b) is changed to (b'): $2x_1 + 2x_2 = 6$

- add object (b') to your plot, label it.
- How many points in the solution set to (a) & (b')?

Imagine (b) is changed to (b''): $-2x_1 - 2x_2 = -4$

- Add (b'') object to your plot. How many points in the solution set to (a) & (b'')?

BONUS: What can happen geometrically (in 3D) if 2 equations in 3 unknowns?

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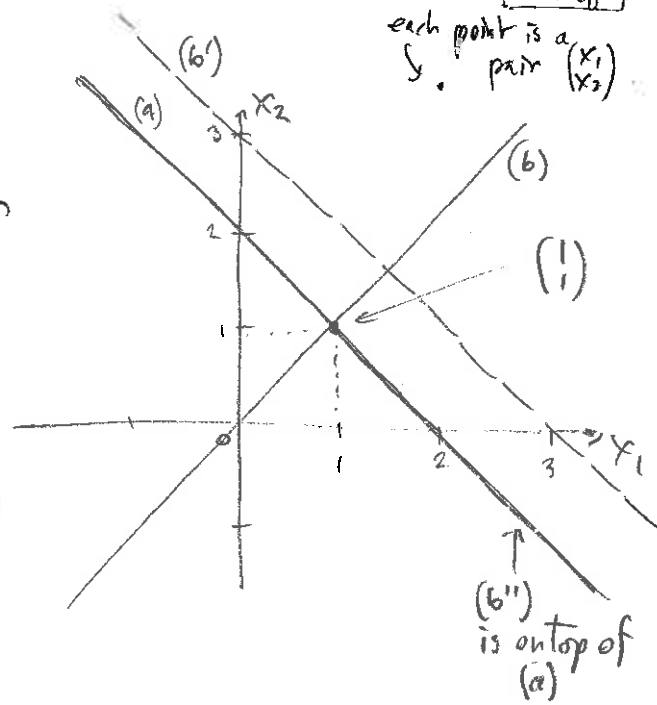
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SOLUTIONS ~

Say equation (a) is $x_1 + x_2 = 2$

it's a line.

- plot the object defined by this single equation in 2D space (think of x_1 as "x axis" & x_2 as "y axis"). Use axes to the right.



Equation (b) is $-x_1 + x_2 = 0$

also a line.

- add the object defined by (b) to your plot, label it.
- How many points in the solution set to the system (a) & (b)?

List them: $\begin{pmatrix} 1 \\ 1 \end{pmatrix}$, that's it. One point in the solution set. (unique).

Imagine (b) is changed to (b'): $2x_1 + 2x_2 = 6$

- add object (b') to your plot, label it. ← it's a line parallel to (a).
- How many points in the solution set to (a) & (b')? None inconsistent. (set is empty).

Imagine (b) is changed to (b''): $-2x_1 - 2x_2 = -4$

- Add (b'') object to your plot. How many points in the solution set to (a) & (b'')? Infinite number of points (all those with $x_1 + x_2 = 2$). Not unique.

BONUS: What can happen geometrically (in 3D) if 2 equations in 3 unknowns? each eqn is a plane, so either get a line, nothing, or a plane.