

# MA 109: September 15

Systems of Equations: Special Cases

## Start of Class

### Instructor Information

Name:

Email:

Office Hours:

## Warm-up Questions

## Notes

Example: Solve the following system of equations

$$\begin{cases} y = -3x + 5 \\ 9 = y + 3x \end{cases}$$

The first equation is already solved for  $y$ , so plug that into the second equation:

$$9 = y + 3x$$

$$9 = (-3x + 5) + 3x$$

$$9 = -3x + 5 + 3x$$

$$9 = 5$$

There are no variables left to solve for, and we are left with a false statement, so this system has

no solution

Example: Solve the following system of equations.

$$\begin{cases} y = -3x + 5 \\ 5 = y + 3x \end{cases}$$

The first equation is already solved for  $y$ , so plug that into the second equation:

$$5 = y + 3x$$

$$5 = (-3x + 5) + 3x$$

$$5 = -3x + 5 + 3x$$

$$5 = 5$$

There are no variables left to solve for, and we are left with a true statement, so this system has

infinitely many solutions

## Summary

Always start by looking for a solution:

- ① solve one equation for one of the variables
- ② plug that into the other equation and solve for the remaining variable
- ③ plug that back into either equation to find the other variable

→ Don't forget to write your final answer as a point

If all the variables cancel out in step 2, there are two possibilities:

- If you are left with a false statement, there is no solution
- If you are left with a true statement, there are infinitely many solutions

## End of Class

Write a summary of what you learned today:

What questions do you have about the material from today?

What do you need to do between now and the next class meeting?