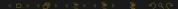
Math 2130 Linear Algebra Week 1 Gauss's method

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Today's topics

- Gauss's method
- Describing sets of points

Gauss's method

Solve the linear system

$$8x - 2y + z = 0,$$
$$y + z = 4,$$

and

$$z = 8$$
.

This has exactly one solution, as we can see by repeatedly substituting.

Gauss's method

Solve the linear system

$$3x + 2y + z = 10,$$
$$x + y + z = 6,$$

and

$$x - z = 2$$
.

This has no solutions because we get a false equation like 0=4 when we put it into echelon form.

Gauss's method

Consider the linear system

$$4x + 3y = -2,$$

and

$$12x + 9y = k.$$

For which values of k does this system have zero, one, or infinitely many solutions?

Describing the solution set

Any consistent linear system's solution set has the form

$$\{p + c_1\beta_1 + \cdots + c_k\beta_k \mid c_1, \ldots, c_k \in \mathbb{R}\}$$

where p is any particular solution, k is the number of free variables that system has after Gaussian reduction, and the β_i are column vectors.