

# 2022-2023 James E Davis Trimester 1 Algebra 2

## Class Notes

9/16

### Previously...

We just watched Hamilton.

### Systems of Equations

**A system of equations or inequalities** is a set of open sentences which contain the same variables.

Example.

$$\begin{array}{rcl} 5x + 2 & = & 7 \\ -2 & -2 & \\ \hline 5x & = & 5 \\ \div 5 & \div 5 & \\ x & = & 1 \end{array}$$

$$7x > 14$$

$$x \geq 7$$

$$x = x$$

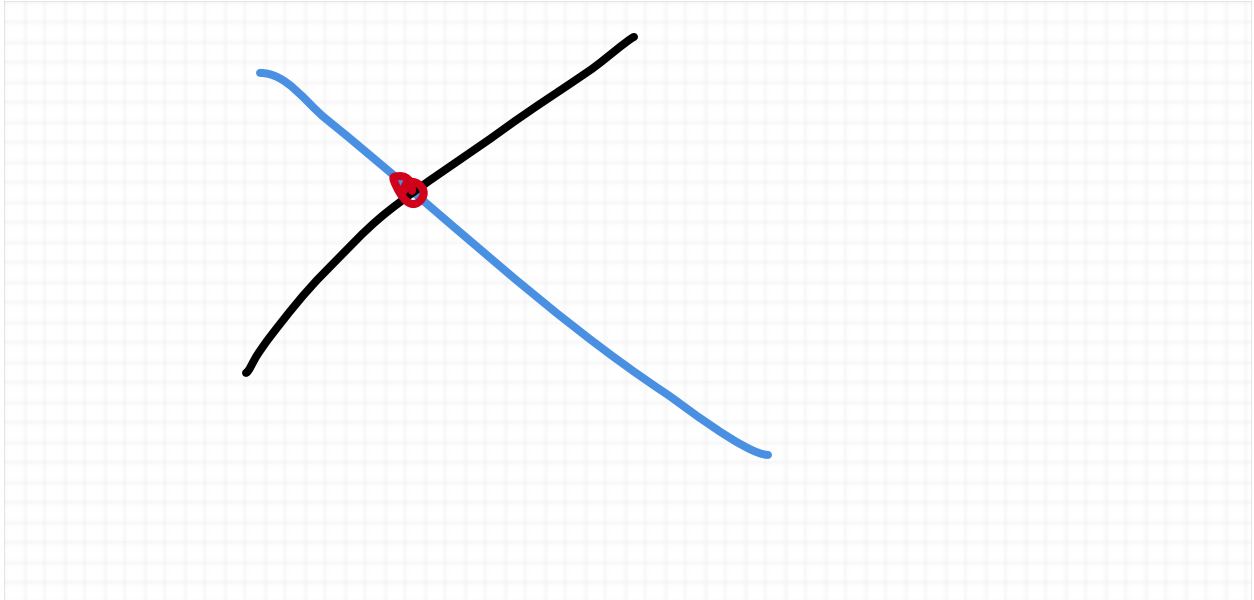
The goal, broadly speaking, for this section, is to solve more advanced systems of equations. We learned from Algebra I how to solve one-variable systems of equations; now we want to solve two-variable systems, for example we have

$$\begin{array}{rcl} 2x - y & = & 10 \\ x + 3y & = & -9 \end{array}$$

The **solution set** of a system with two variables is the set of all ordered pairs that satisfy the open sentences in the system.

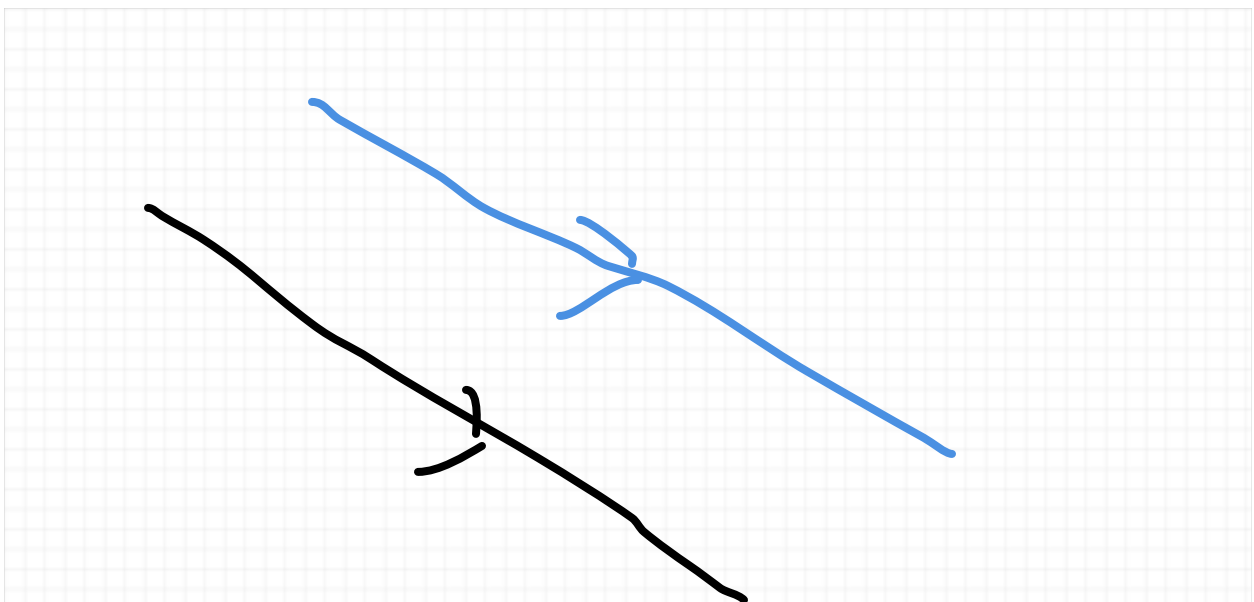
### Scenario 1

The lines representing the equation are different and have one point of intersection; in this situation, the solution is a unique ordered pair



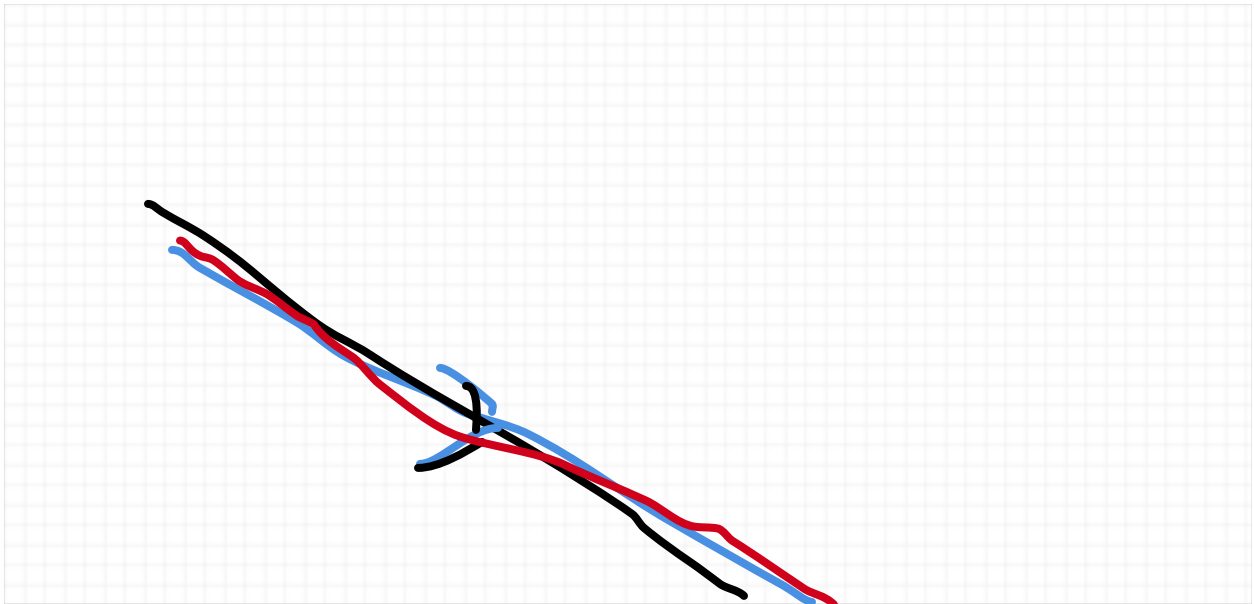
### Scenario 2

The two lines representing the equation are parallel, and have no point of intersection, and no solution exists. We often call this scenario a **contradiction**.



### Scenario 3

The lines representing a system of equations are the same, and hence the solution set is the entire line itself, i.e., sometimes, there are solutions, but the solutions aren't unique. We call this scenario an **identity**.



## Solving Systems of Equations

To solve the system of equations, there are a few possible methods to do so, at least three of which we'll discuss in this class.

**1. The graph method**, i.e., we just draw the lines representing each equation in the system, and find all the points of intersection visually.

**2. The substitution method**, i.e., we solve one of the equations in terms of the other variable, then we substitute that into the other equation to get a one-variable equation, and proceed with solving that single variable, getting the solution that way.

**3. The determinant method.** Find the determinant of a system of equations and use it to compute the solution to the system of equations. Broadly speaking, this is based on looking at the system of equations as a matrix (maybe I'll show you what I mean by that later).

## **Preview for Monday**

Do some practice with the substitution and graphing method