Fall 2021 Precalc
Lesson 2.3

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Herbert H. Lehman High School
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Do Now

Be sure to…Get out your notebook/binder. Read the paragraph below carefully, then answer the questions below. Show all work and check your results!

1. Describe the system to the right using precise mathematical language.
2. Solve for x, y, and z.

$$\begin{cases} 2x - y + 5z = 16 \\ y + 2z = 2 \\ z = 2 \end{cases}$$

class: precalc **goal:** HDW use the elimination to solve multivariate systems of equations?

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1. This is a system of linear eqs written in row echelon form.
2. y =

B24 rules

Welcome to our new room, B24! Please read the information below:

1. When you come in, please find a seat at a desk (if one's available) or one of the six closest desks to the screen. ***Do not sit in the back of the classroom***. We'll conduct the do now and mini lesson from here.
2. When I dismiss you for independent work, find a sit at one of the computer workstations.
3. ***No food or drink by the computers.***
4. At the end of the period, you'll be directed to assemble for the exit ticket/debrief. Log out of your computer, and ***quietly*** return to a seat near the front.

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framing

- **what:** use the elimination to solve multivariate systems of equations
- **why:** Systems of equations are useful in situations where variables must more than two conditions.
- **where to:** representing systems of equations as matrices

Row-echelon form (review)

To solve systems with more than two variables, we want to transform the system into **row-echelon form:**

System of Three Linear Equations in Three Variables

$$\begin{cases} x - 2y + 3z = 9 \\ -x + 3y + z = -2 \\ 2x - 5y + 5z = 17 \end{cases}$$

Equivalent System in Row-Echelon Form

$$\begin{cases} x - 2y + 3z = 9 \\ y + 4z = 7 \\ z = 2 \end{cases}$$

A system is in row-echelon form if it has a stair-step pattern and each equation has a leading coefficient of 1.

Row operations

Gaussian elimination involves three operations:

1. Exchange equations
2. Multiply one of the equations but some number (but not zero)
3. Add one equation to a multiple of another equation

Johann Gauss, the guy who came up with this algorithm

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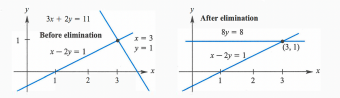
mini-lesson

Let's use elimination to solve this system:

$$x - 2y = 1$$
$$3x + 2y = 11$$

1. Exchange equations
2. Multiply one of the equations but some number (but not zero)
3. Add one equation to a multiple of another equation



class: precalc **goal:** HDW use the elimination to solve multivariate systems of equations?

see pg. 490 of textbook for solution.

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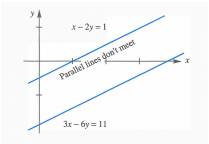
mini-lesson

Let's use elimination to solve this system:

$$x - 2y = 1$$
$$3x - 6y = 11$$

1. Exchange equations
2. Multiply one of the equations but some number (but not zero)
3. Add one equation to a multiple of another equation



class: precalc **goal:** HDW use the elimination to solve multivariate systems of equations?

see pg. 490 of textbook for solution.

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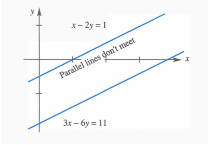
mini-lesson

Let's use elimination to solve this system:

$$x - 2y = 1$$
$$3x - 6y = 3$$

1. Exchange equations
2. Multiply one of the equations but some number (but not zero)
3. Add one equation to a multiple of another equation



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mini-lesson

1. Exchange equations
2. Multiply one of the equations but some number (but not zero)
3. Add one equation to a multiple of another equation

Let's use elimination to solve this system:

$$\begin{cases} x - 2y + 3z = 9 \\ -x + 3y + z = -2 \\ 2x - 5y + 5z = 17 \end{cases}$$

class: precalc **goal:** HDW use the elimination to solve multivariate systems of equations?

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mini-lesson

1. Exchange equations
2. Multiply one of the equations but some number (but not zero)
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With a partner, try to solve these systems using Gaussian elimination:

a.
$$\begin{cases} x + y + z = 6 \\ 2x - y + z = 3 \\ 3x - z = 0 \end{cases}$$

b.
$$\begin{cases} 3x - 2y + 4z = 1 \\ x + y - 2z = 3 \\ 2x - 3y + 6z = 8 \end{cases}$$

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Independent work

1. Use elimination and back substitution to solve the systems below:

a.
$$\begin{cases} 3x - 3y + 6z = 6 \\ x + 2y - z = 5 \\ 5x - 8y + 13z = 7 \end{cases}$$

b.
$$\begin{cases} x - 3y + z = 1 \\ 2x - y - 2z = 2 \\ x + 2y - 3z = -1 \end{cases}$$

c
$$\begin{cases} x + y - 3z = -1 \\ y - z = 0 \\ -x + 2y = 1 \end{cases}$$

class: precalc **goal:** HDW use the elimination to solve multivariate systems of equations?

possible exit tickets

Reflection

- How is elimination different from substitution?
- Why is it useful to reduce systems of equations to row-echelon form?

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wrapping up!

be sure to: read the directions below!

1. Make sure there isn't any litter near your workstation.
2. If you borrowed headphones, sign them back in.
3. **Make sure you are logged out of your computer!**
4. Remain in your seat until the bell rings.