



## Fall 2021 Precalc Lesson 3.2

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Do Now

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Be sure to...Get out your notebook/binder. Answer the questions below. Write a complete sentence for each question!

1. How many columns are in the spreadsheet to the right? How many rows?
2. Why do you think it's useful to represent data in spreadsheets?

	A	B	C	D	E
1	Name	Job	Fictional	Born On	Updated At
2	Bilbo Baggins	Burglar	TRUE	9/21/1937	
3	Bill Nye	Scientist	FALSE	11/27/1965	
4	Billie Eilish	Artist	FALSE	12/18/2001	
5	Vin Vaname	Musician	TRUE	7/17/2005	
6					

class: precalc goal: HDW perform Gaussian elimination on matrices?

1. 5 columns and 5 rows.
2. We can access data by row and column. Easier to represent and access data.



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### 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:** perform Gaussian elimination on matrices
- **why:** Matrices are a useful way to solve systems of equations
- **where to:** Review for Thursday quiz!

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**Matrices**

An  $m \times n$  matrix is an array with  $m$  rows and  $n$  columns:

$$\begin{array}{c}
 \text{Column 1} \quad \text{Column 2} \quad \text{Column 3} \quad \dots \quad \text{Column } n \\
 \begin{array}{l}
 \text{Row 1} \\
 \text{Row 2} \\
 \text{Row 3} \\
 \vdots \\
 \text{Row } m
 \end{array}
 \begin{bmatrix}
 a_{11} & a_{12} & a_{13} & \dots & a_{1n} \\
 a_{21} & a_{22} & a_{23} & \dots & a_{2n} \\
 a_{31} & a_{32} & a_{33} & \dots & a_{3n} \\
 \vdots & \vdots & \vdots & \ddots & \vdots \\
 a_{m1} & a_{m2} & a_{m3} & \dots & a_{mn}
 \end{bmatrix}
 \end{array}$$

where each entry  $a_{ij}$  is a real number.

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**Matrix vocabulary****Coefficient matrix**

Matrix containing the coefficients from the left hand side of the system of equations

System:

$$\begin{cases}
 x - 4y + 3z = 5 \\
 -x + 3y - z = -3 \\
 2x - 4z = 6
 \end{cases}$$

Coefficient Matrix:

$$\begin{bmatrix}
 1 & -4 & 3 \\
 -1 & 3 & -1 \\
 2 & 0 & -4
 \end{bmatrix}$$

**Augmented matrix**

Matrix containing the coefficients from the left hand side of the system of equations and also the numbers on the right hand side

Augmented Matrix:

$$\begin{bmatrix}
 1 & -4 & 3 & \vdots & 5 \\
 -1 & 3 & -1 & \vdots & -3 \\
 2 & 0 & -4 & \vdots & 6
 \end{bmatrix}$$

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## Augmented matrix

Write the augmented matrix for each system of equations:

a. 
$$\begin{cases} x + 3y = 9 \\ -y + 4z = -2 \\ x - 5z = 0 \end{cases}$$

b. 
$$\begin{cases} x + 3y = 9 \\ -y + 4z = -2 \\ x - 5z = 0 \end{cases}$$

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## Gaussian elimination on an augmented matrix

Convert the system below to augmented matrix form. Then perform Gaussian elimination.

Linear System

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

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See pg. 507 textbook.



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## Independent work

1. Solve the nonsquare system below:

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

2. (a) convert the linear system below to an augmented matrix.

(b) Identify the dimensions of this matrix

(c) Convert the matrix to row echelon form:

$$\begin{cases} x + 2y + 3z = 4 \\ -x - 2y + z = 5 \\ 2x + 8y + z = -2 \end{cases}$$

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1.  
pivot: 2, elimination coefficient: -4, multiplier: 2

$$\begin{array}{rcl} 4x - 6y + 2z & = & -4 \\ -4x + 9y & = & 7 \end{array}$$

$$3y + 2z = 3$$

$$y + \frac{2}{3}z = 1$$

$$y = 1 - \frac{2}{3}z$$

$$4x - 6(1 - \frac{2}{3}z) + 2z = -4$$

$$4x - 6 + 4z + 2z = -4$$

$$4x + 6z = 2$$


$$2x + 3z = 1$$

$$x = 0.5 - 1.5z$$

$z = a$ , where  $a$  is any real.


2. This system will appear to end up with a zero pivot in the second row, if students don't perform a row exchange (see ipad for detailed solution).

3.



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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.

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