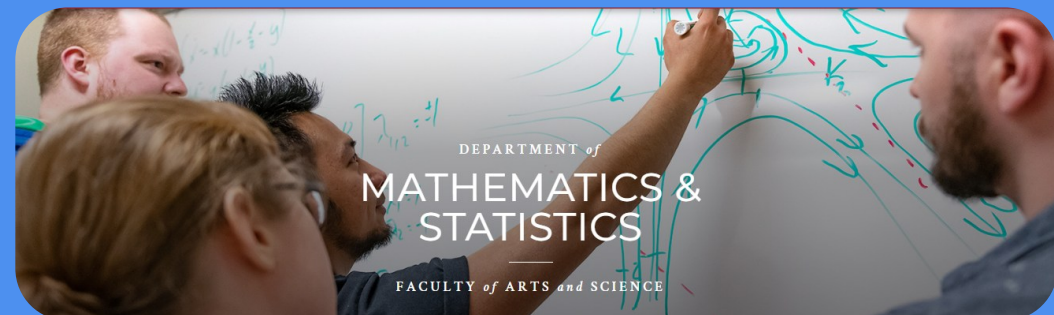


Confidence and Community as Learning Outcomes

FYMSiC Online Conference, May 7th, 2025

Elaine Beltaos-Kerr, MacEwan University, Edmonton





Linear Algebra at MacEwan



- *Ideal vehicle as first or only course*
- *Taken by the math phobic, underprepared*
- *Taught vectors-first means no computations for the first week*
- *Can get away with minimal background knowledge*
- *Linear algebra -- vector operations, spaces and subspaces, structure of solution sets, linear independence, invertibility, bases/spanning sets/dimension*



What is a learning outcome?

- *Something the student can do, know or value by the end of the course*
- *Specific*
- *Measurable*
- ***Classic examples:*** *solve a linear system, prove basic theorems about matrices, determine whether a set of vectors is linearly independent*



What about
these?

- *Read and write mathematics effectively*
- *Apply algebraic thought processes to an unfamiliar problem*
- *Exercise appropriate mathematical judgement*
- *Develop confidence in mathematical inquiry and problem-solving**
- *Belong in a mathematical classroom**

Belonging in the Classroom – Classroom as Community



- *Course Outline/First Day of Class*
- *Classroom Culture*
- *Relationship Building, Trust, Communication*
- *Access to Background Material*
- *UDL*
- *Pedagogy of Care*
- ***Resource Design***
- *Homework Design*
- *Collaboration*

Belonging Examples

If you require review on any of these topics, please see the section “Background Material” on mēskanâs. If anything else comes up during the course, please feel free to contact me or utilize the Math and Stats Learning Centre in 6-313.

Important: I will never make you feel bad for gaps in your background or forgotten skills. It happens to the best of us.

What would work better for you?

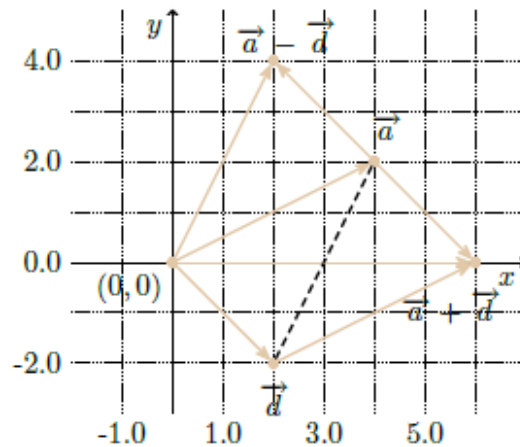


Figure 2.1.2

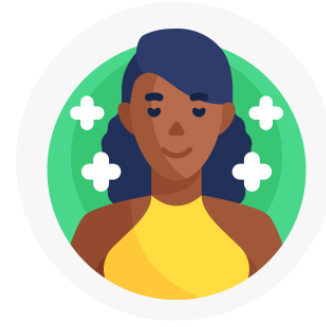
Let's Build Together

What is Mathematics to You?

$$\begin{aligned}\vec{a} &= (4, 2) \\ \vec{d} &= (2, -2) \\ \vec{a} + \vec{d} &= (4, 2) + (2, -2) \\ &= (4 + 2, 2 + (-2)) \\ &= (6, 0) \text{ 😊} \\ \vec{a} - \vec{d} &= (4, 2) - (2, -2) \\ &= (4 - 2, 2 - (-2)) \\ &= (2, 4) \text{ 😊}\end{aligned}$$

image: Jasper Nice

Confidence Building



- *Start Fresh Approach*
- *Access to Background Topics*
- *Student Independence*
- *Curiosity ↔ Confidence*
- *Resource Design*

- *Homework Design*
- *Assessment Design*
- *Integration of Topics*
- *Grading Practices and Feedback*

Confidence Building Examples

2. Determine whether the expression is a vector, scalar, or undefined. If it is undefined, explain why.

a. $\|2\vec{v}\|$ b. $\|2\|$ c. $|-2|\vec{v}$ d. $\|2\vec{a} - \vec{b}\|$ e. $\|2\vec{v}\| + 3$

f. $2\vec{v} + 3$ g. $\|\vec{a} - \vec{b}\| \vec{b}$

- Each week I will be posting Video Exercises. These are videos of me solving problems similar to your exercise sets. You may find them helpful if you are not sure how to solve a problem or how to present your solution for full marks.

4. Let $A = \begin{bmatrix} 2 & 1 & 1 \\ 0 & 2 & 11 \\ -1 & 0 & 2 \end{bmatrix}$.

- Show that A is invertible by finding the determinant of A .
- Find A^{-1} by using row operations and confirm your answer using matrix multiplication.

Is it All Worth it?

Linear algebra was not what I expected it to be at all, but I had so much fun learning and can't wait to take this knowledge forward with me in the future.

...I never considered math a major, let alone a minor, until I took your MATH 125 class. It opened me up to a whole new world...

...I wanted to write to you out of gratitude for not only helping me get through a class that I was dreading but also shifting my viewpoint on mathematics.

[Previously], I felt so lost in the class and much too intimidated to ask for any help, the same feeling I felt in math classes all my life...

From the bottom of my heart, ... thank you for helping to ease my lifelong aversion to math.