

# Welcome to Linear Algebra

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# What is Linear Algebra?

Linear algebra is the study of **linear maps**.

- In Calculus, you learn how to approximate any function by a linear function.
- In Linear Algebra, we learn about how linear maps behave.
- Combining the two, we can approximate how any function behaves.

# What is Linear Algebra good for?

- In an abstract sense, linear algebra is arguably the most used tool in higher math.
- In computer graphics, linear algebra is used to help represent 3-dimensional objects in a two dimensional grid of pixels.
- Differential equations are often very difficult (or impossible) to solve exactly; we use linear algebra to understand approximate solutions in a vast number of engineering applications such as fluid flows, vibrations, heat transfer, etc.
- Google's famed Page Rank algorithm is based on linear algebra

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- Perform fundamental operations in the algebra of matrices, including multiplying and inverting matrices.
- Use and apply algebraic properties of a linear transformation.
- Determine geometric information about a linear transformation, including computing determinants, eigenvalues, and eigenvectors.

# Standards Based Grading

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You will be given several opportunities to demonstrate mastery throughout the semester, and if at first you don't succeed, you can try again without any penalty.

# SBG

The course material is broken down into 23 learning **standards**.

- Each attempted exercise will be simply marked according to whether or not your solution demonstrates mastery of the relevant standards.
- Each solution that demonstrates complete mastery counts as a **checkmark** for that standard.
- Up to two checkmarks may be earned for each standard. Your grade depends on the total number of checkmarks you earn this semester (up to 46).
- Standards will be assessed several times, and there's no penalty for incorrect solutions. So, if you don't succeed the first time, keep studying and try again!

# Assessment Opportunities

Checkmarks may be earned as follows.

- **Quizzes:** Each day at the end of class we will have a quiz. This is how you should earn most of your checkmarks.
- **Midterm:** There will be a single midterm exam the week of Fall Break to give you the chance to catch up on missed standards.
- **Final Exam:** Your final opportunity to demonstrate mastery, cumulative over the entire course.
- **Out-of-class Reassessments:** A limited number of opportunities will be provided to earn checkmarks outside of class.

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The assessment method (quiz/exam/etc.) you used to earn a checkmark isn't important: I only care that you learn the material and demonstrate that mastery to me before the end of the semester!

# Interpreting Feedback

On each assessment, for each standard you will receive one of the following marks.

- **M** means you demonstrated **Mastery** of that standard.  
Great job! Check off another box on your progress sheet.
- \* means you have a minor mistake, but if you can correct it, this mark will be changed to **M**.
- **R** means you made a good faith effort and demonstrated partial understanding, but not complete mastery. You are eligible to **Reattempt** the standard outside of class.
- **N** means there was **No Significant Evidence** of understanding.

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Marks other than **M** do not improve your course letter grade, but they don't hurt you either.



# Course Grades

- A
- Earn 40 mastery checkmarks.
  - Complete 10 homework reports.
  - Have an 80% attendance record.
- OR 45 ✓s
- 

- B
- Earn 35 mastery checkmarks.
  - Complete 8 homework reports.
  - Have an 80% attendance record.
- OR 40 ✓s
- 

- C
- Earn 30 mastery checkmarks.
  - Complete 6 homework reports.
  - Have an 80% attendance record.
- OR 35 ✓s

# Homework

Homework is practice.

- I will not collect or grade homework problems.
- A list of suggested exercise for practice is in USAOnline, sorted by standard. You should work as many or as few of these as you need to master the material.
- **Caveat discipulus:** Most students do not work as many homework exercises as they should.
- If you need help or feedback, come to my office hours.
- I will collect homework reports each week (blank form in USAOnline).

# Class structure

- The course is divided into six modules, each lasting about 2 weeks.
- At the beginning of each module is one review day working through examples from previous courses and standards.
- The next 3-4 class days will consist of lectures covering several exercises/activities that will help you master the course standards.

# Office Hours

Choose up to 3 one-hour long periods your team would like me to have an office hour during. Rank them in order of your preference.

I have the following constraints:

- They must be during business hours, i.e. 8-5.
- I teach another class from 12:30-1:45 on TR
- I have departmental meetings/seminars 3:30-5 on Thursdays