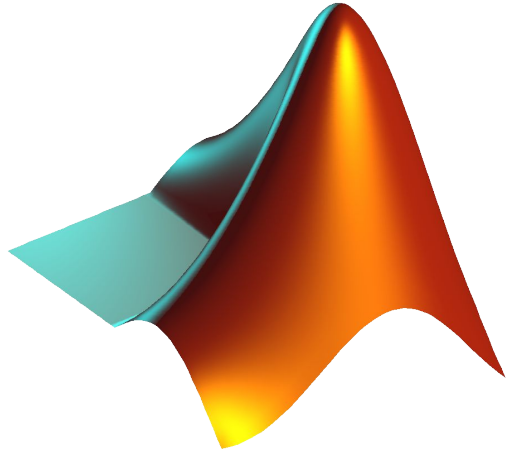


# Welcome to CS 1112 Intro to Computing Using MATLAB!



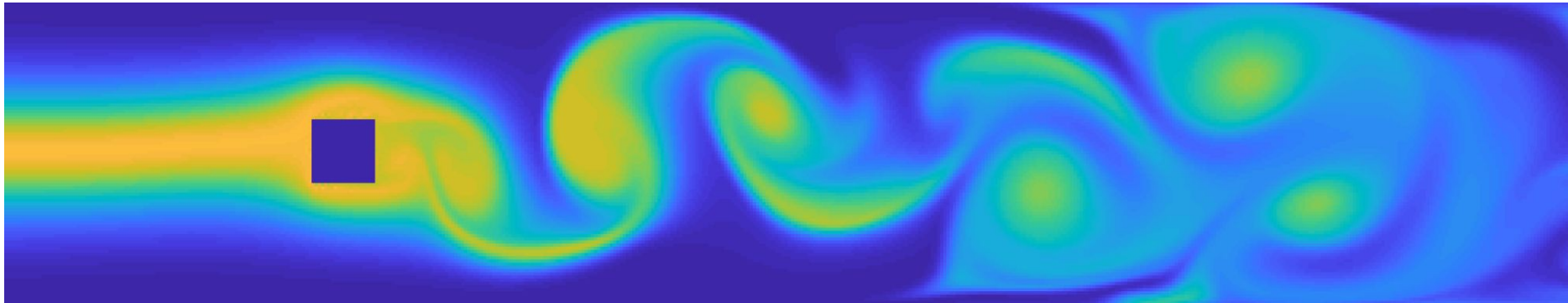
Instructor: Dominic Diaz

# Announcements

- Check out the course website:  
<https://www.cs.cornell.edu/courses/cs1112/2022fa/>
  - Pay attention to Syllabus
  - Website is public—can read info even if not yet enrolled
- Discussion sections start TOMORROW
  - All sections are in computer labs

# Who is Dominic?

PhD student in applied mathematics  
interested in fluids, machine learning,  
and birds!



# About you... in CS 1112

- Undergraduates, graduates, researchers, and professionals who want (need) to learn computing
- No prior programming experience necessary but some “mathematical maturity”
- You will
  - Learn programming concepts and good programming habits
  - Practice problem analysis and decomposition

# CS 1112 or CS 1110?

- Both courses are designed to prepare students for CS 2110 and future computer science courses
- Both teach you programming fundamentals that you use in any other programming language

CS 1112 (MATLAB)	CS 1110 (Python)
<ul style="list-style-type: none"><li>● Slight emphasis on scientific computation</li><li>● No too much math background required</li><li>● Coziness of being a smaller class</li></ul>	<ul style="list-style-type: none"><li>● Slight emphasis on software application development</li><li>● Stronger math background required</li><li>● Huge class</li></ul>

# Today's agenda

- Course syllabus, logistics, and policies (highlights)
- What is computer programming and what is MATLAB?
- An illuminating problem (first MATLAB code!)

# CS 1112 Requirements

- Attend lecture and answer Poll Everywhere questions
- Attend discussion - complete weekly exercises and get help from course staff
- Do homework: 6 programming projects
- Take 2 preliminary exams and 1 final

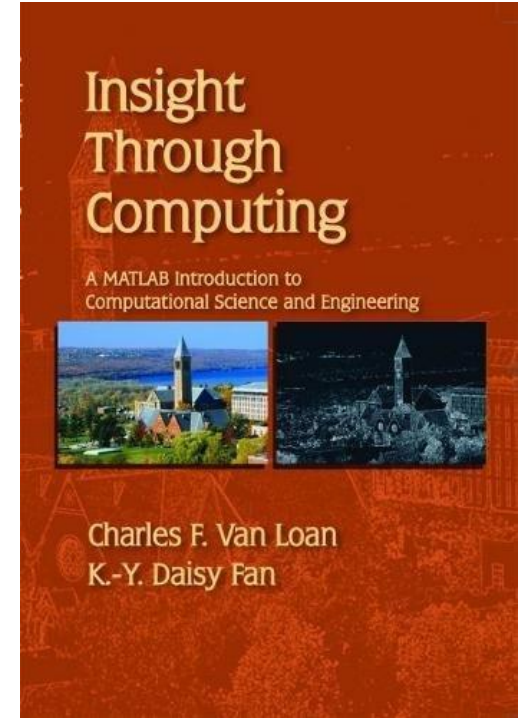
# How to do well in this class

- Do the *highly recommended* reading
- Find a buddy in the course
- Think about what you've learned after leaving this lecture hall



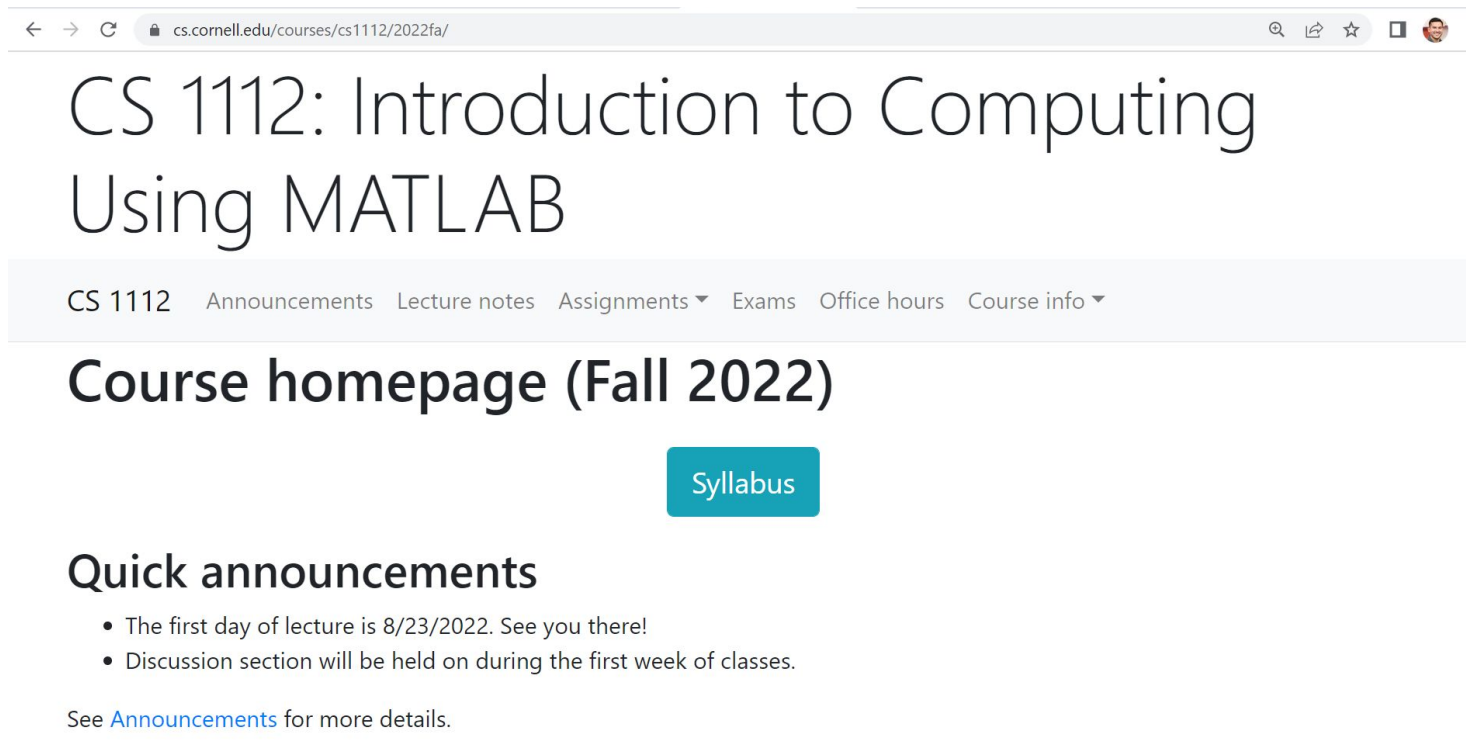
# Course Materials

- Insight through Computing: A MATLAB Introduction to Computational Science and Engineering
- MATLAB Student Version
  - Use MATLAB Online or download MATLAB onto your own computer—it's free for students!
  - Tomorrow's discussion section will help you with this



Let's check out the course website quickly...

<https://www.cs.cornell.edu/courses/cs1112/2022fa/>



The screenshot shows a web browser window with the URL <https://www.cs.cornell.edu/courses/cs1112/2022fa/>. The page title is "CS 1112: Introduction to Computing Using MATLAB". Below the title is a navigation menu with links for "CS 1112", "Announcements", "Lecture notes", "Assignments", "Exams", "Office hours", and "Course info". The main heading is "Course homepage (Fall 2022)", followed by a prominent teal button labeled "Syllabus". Underneath is a section titled "Quick announcements" containing two bullet points: "The first day of lecture is 8/23/2022. See you there!" and "Discussion section will be held on during the first week of classes." At the bottom, there is a link to "See Announcements for more details."

CS 1112: Introduction to Computing Using MATLAB

CS 1112 Announcements Lecture notes Assignments Exams Office hours Course info

## Course homepage (Fall 2022)

Syllabus

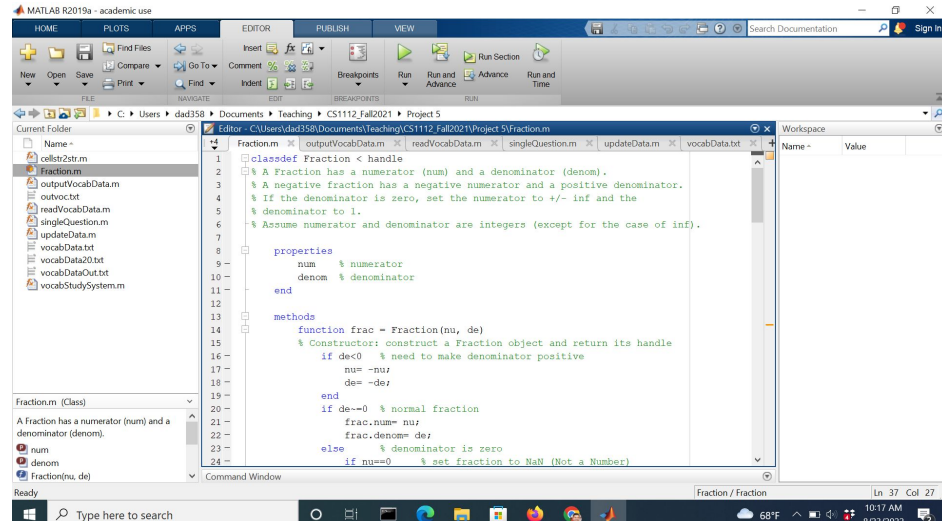
### Quick announcements

- The first day of lecture is 8/23/2022. See you there!
- Discussion section will be held on during the first week of classes.

See [Announcements](#) for more details.

# What is computer programming?

- A tool used by computer scientists, engineers, and other professionals
- The process of writing instructions for computing devices and systems.
  - These instructions are written in different languages (for example, MATLAB, Python, ...)



The screenshot displays the MATLAB R2019a environment. The main window shows the Editor with a class definition for 'Fraction'. The class is defined as a handle class with two properties: 'num' (numerator) and 'denom' (denominator). A constructor function 'frac' is defined, which takes 'nu' and 'de' as inputs and returns a 'Fraction' object. The constructor includes logic to handle negative denominators, zero denominators, and non-integer values.

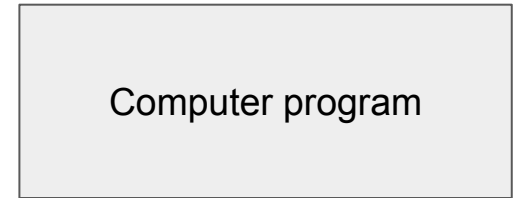
```
1 classdef Fraction < handle
2     % A Fraction has a numerator (num) and a denominator (denom).
3     % A negative fraction has a negative numerator and a positive denominator.
4     % If the denominator is zero, set the numerator to +/- inf and the
5     % denominator to 1.
6     % Assume numerator and denominator are integers (except for the case of inf).
7
8     properties
9         num % numerator
10        denom % denominator
11    end
12
13    methods
14        function frac = Fraction(nu, de)
15            % Constructor: construct a Fraction object and return its handle
16            if de<0 % need to make denominator positive
17                nu = -nu;
18                de = -de;
19            end
20            if de==0 % normal fraction
21                frac.num = nu;
22                frac.denom = de;
23            else % denominator is zero
24                if nu==0 % set fraction to NaN (Not a Number)
```

# Computer programming in MATLAB

Using MATLAB, you can easily:

- Develop computer programs
- Display results and ideas graphically
- Interact with large data sets (process text, image, other files)

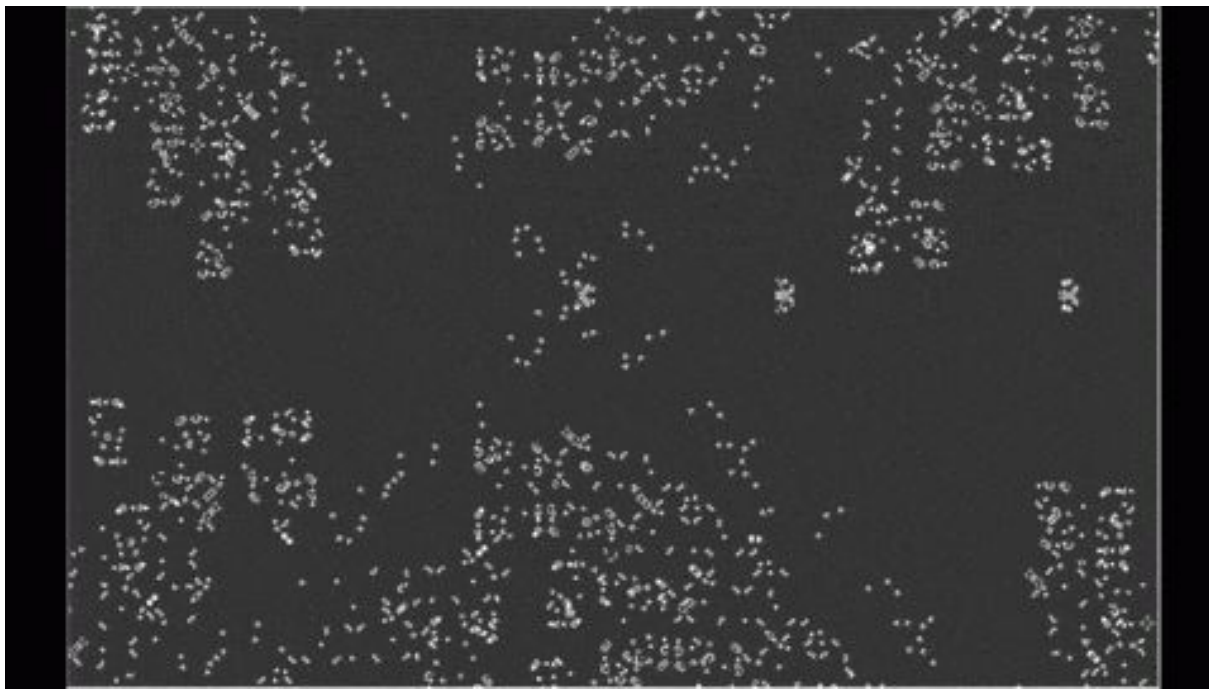
MATLAB has extensive libraries of mathematical, statistical, simulation, and other tools. It is heavily used in engineering and sciences, both in industry and academia.



Which image shows a lion?

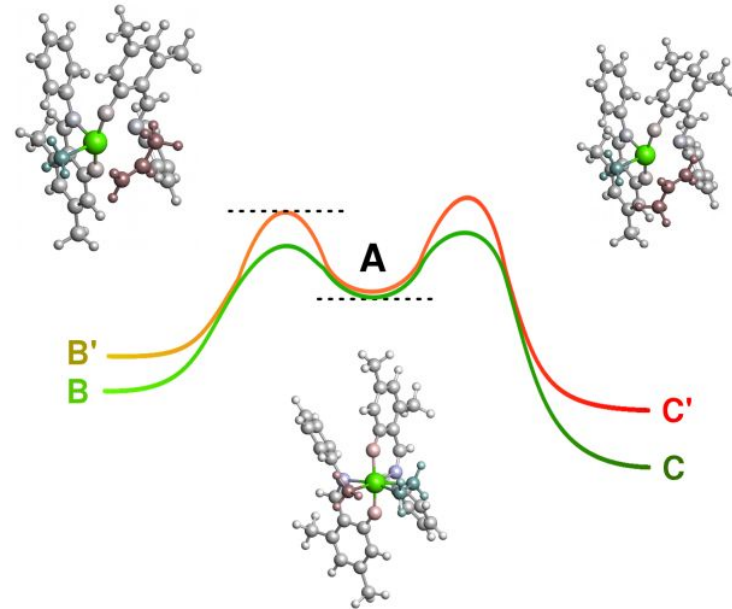
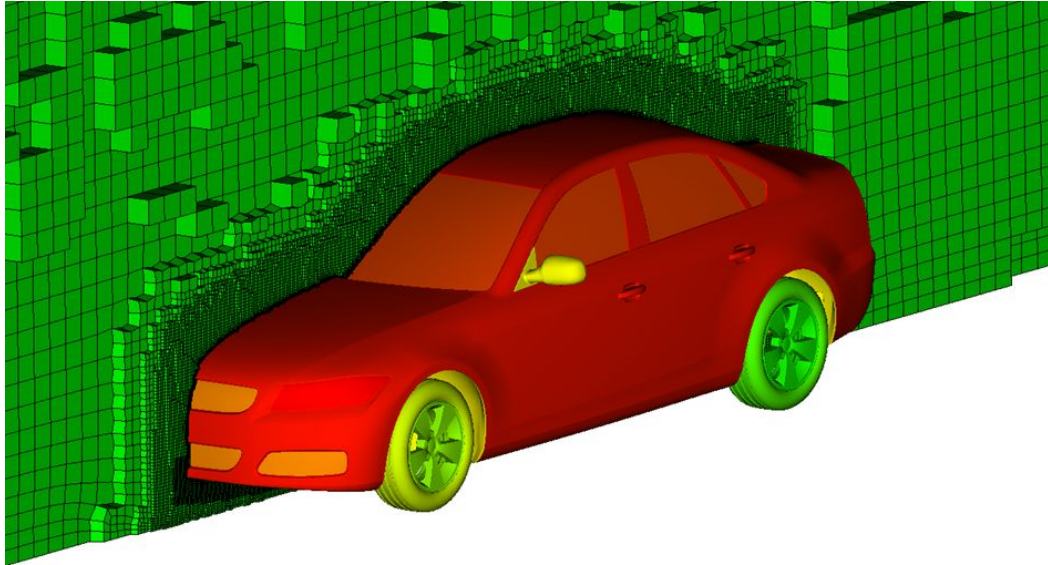
CS 1112 has a focus on computational science and engineering

Approximation, randomness,  
model building, sensitivity of models



# By learning the fundamentals in this course you can...

Approximate complex systems with less complex systems



# By learning the fundamentals in this course you can...

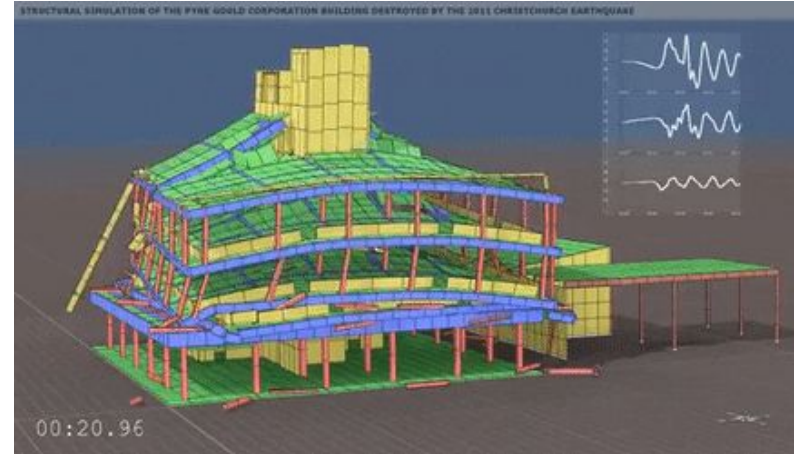
Analyze the randomness of a system



Gif courtesy of  
<https://www.presentermedia.com/powerpoint-animation/businessman-shoot-arrows-pid-22888>

# By learning the fundamentals in this course you can...

Build models to approximate what is happening in the real world



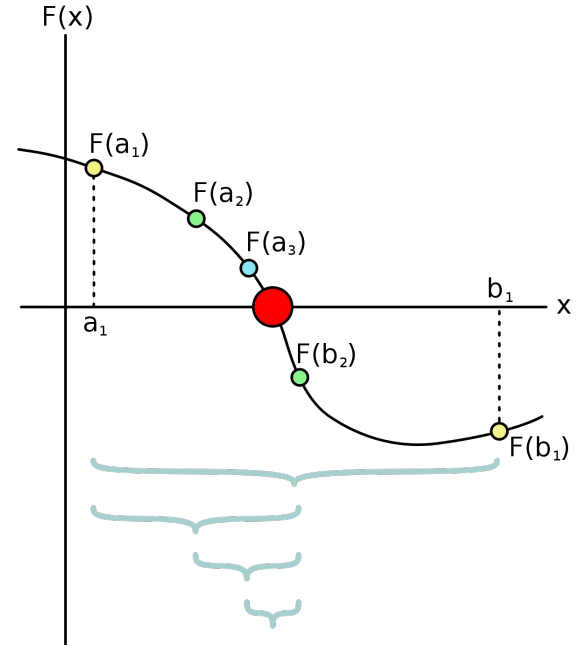
Gif courtesy of <https://gfycat.com/deafeningfilmsyheterodontosaurus>



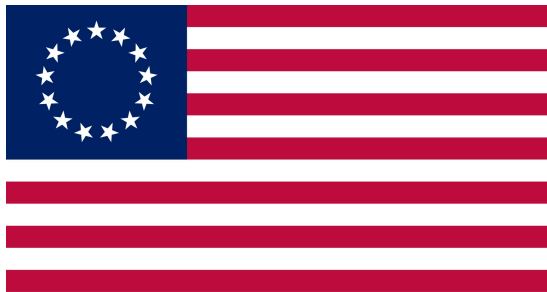
# Some past programming projects in this course



Pointilizing images



Root finding

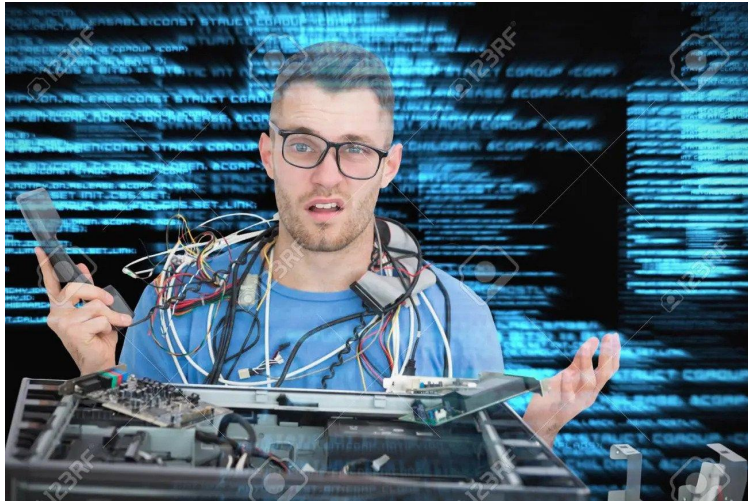


Draw the Betsy Ross flag

# Course goals

- Develop your “computational senses”, senses that you need in computer problem-solving
- Develop a facility with the MATLAB programming environment

Help you go from this...



To this!



If you were not in lecture,  
check out the gif here:  
<https://tenor.com/search/ears-hair-gifs>

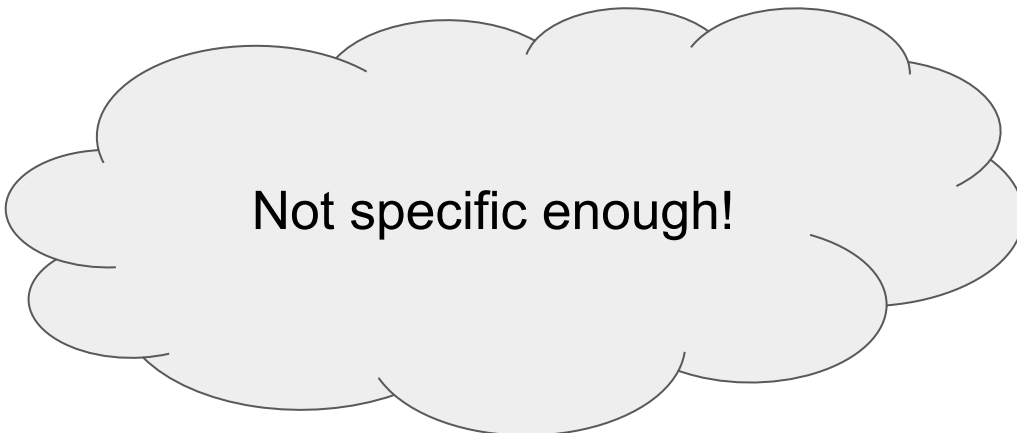


# Algorithms and programs?

- Algorithm: A step-by-step procedure that takes you from a prescribed set of inputs to a prescribes set of outputs
- Program: The algorithm expressed in a specific coding language (for example, MATLAB)

## Example: downloading Bad Bunny's new album to apple music

1. Open the app
2. Type "Bad Bunny"
3. Click on the new album
4. Add the album to your library



**Not specific enough!**

## Example: downloading Bad Bunny's new album to apple music

1. Click "Add to library"
2. Click on "Un Verano Sin Ti"
3. Open Apple Music
4. Click on Search in the bottom right corner
5. Type "Bad Bunny" into the search bar
6. Click on the three dots button on the top right of the screen

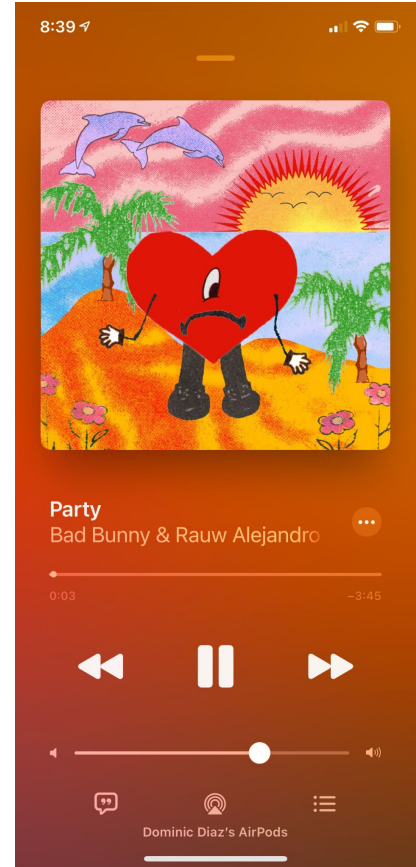


Directions out of order

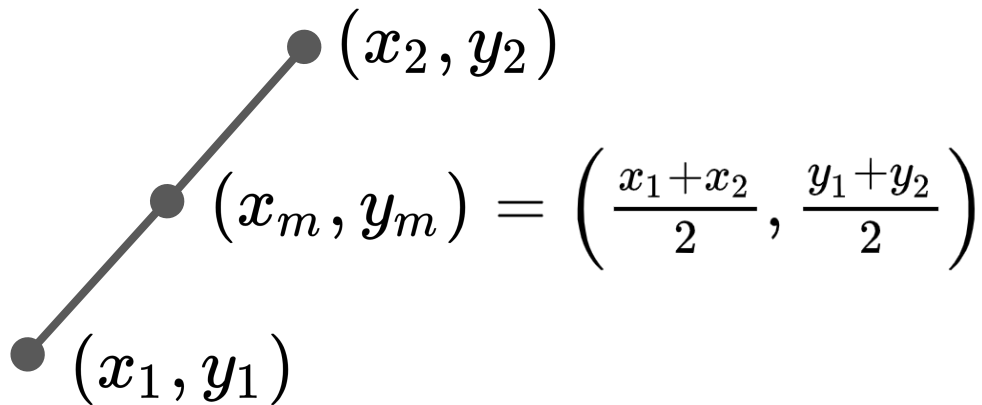
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1. Open Apple Music
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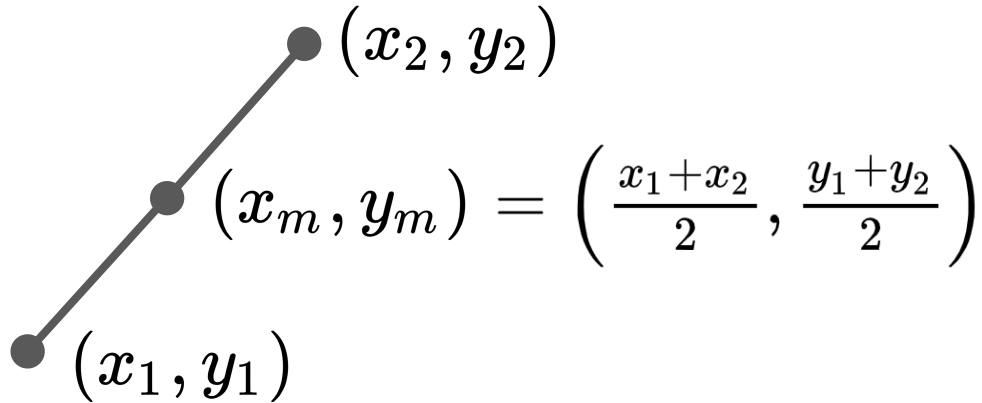
Steps here are good!



Easy example: compute the midpoint of a line



Easy example: compute the midpoint of a line



% the first point

x1 = 1;

y1 = 1;

% the second point

x2 = 10;

y2 = 3;

% the midpoint

xm = (x1 + x2)/2;

ym = ???



# What to do now?

- Consider optional Academic Excellence Workshop (AEW)
- Check out course website
- Do the *highly recommended* pre-lecture reading!
- Attend the discussion section in which you are enrolled TOMORROW!