MATLAB
Introduction
With Michael Tanguay
Overview

1. The Importance of having a programming language
2. What is MATLAB
3. Why you should use MATLAB
4. My experiences with MATLAB
5. What MATLAB has been used for
6. Questions
1. The Importance of Programming

Solve the following linear system of equations:

\[
\begin{align*}
2x + 5y + 10z &= 10 \\
5y + 10z &= 20 \\
2z &= 2
\end{align*}
\]
1. The Importance of Programming

Now solve this linear system:

\[
\begin{align*}
2a + 5b + 10c + 20d + 30e + 16f &= 3 \\
12a + 15b + 4c + 13d + 2e + f &= 20 \\
32a + 50b + 67c + 200d + 19e + 20f &= 1 \\
14a + 41b + 18c + 25d + 3e + 3f &= 100 \\
a + 90b + 13c + 35d + 16e + 17f &= 21 \\
3a + 9b + 2c + 17d + 8e + 106f &= 32
\end{align*}
\]
1. The Importance of Programming

Hand Calculations

- Repetition in Calculations
- Exhaustive Calculations
- Complex steps involve
- Time consuming
- Human error
- Hand plotting

Programming

- Use of loops or simply recalling a program
- Only make a program once.
- Plug and Chug
- Carries over a bunch of precision (Though a computer could only store so much, machine epsilon, truncation)
- Tell the program to plot it for you

-Eureka!
1. The Importance of Programming

**Feasibility**
Want something done fast, right, and easy

**Automation**
Have the program do the work for you

**Marketability**
MATLAB is a tool and a skill
2. What is MATLAB?

- “MATLAB is a programming platform designed specifically for engineers and scientists.” – Mathworks
- MATLAB is short for MATrix LABoratory
- Higher level language, object oriented, top-down and left to right.
- Ideal for its user-friendly interface for plotting and numerical computations
- Algorithms, app design
Convenient
Easy to code
Quick learning curve
Ability to process matrices
Extremely friendly user interface and visualization
Support
Toolboxes
Continually Updated
Employability

Why you Should use MATLAB

```
transpose,
```

Syntax

```
A.`
transpose(A)
```

Description

A.` computes the nonconjugate transpose of A. `transpose(A)` is equivalent to A.`

Examples

Transposes of Real Matrix

Create a 2-by-3 matrix, the elements of which represent real numbers.

```
syms x y real
A = [x y x; y y x]
```

```
A =
[ x, x, x]
```

```
1- clear, clc, close all
2- %Comment what code does/ over concept
3- %Initializations
4- x = 4; y = 2; %Comments about units and other information go here
5- %Statements and Operations
6- answer = x + y; %What does each line do? Comments about the statements go here
7- %Print out final answer
8- answer
```
4. My Experiences with MATLAB

1. Assisted in a graduate's thesis
2. Personal projects
3. Partial Differential Equations
4. Numerical Computations
5. GUIs for Sandia National Labs
6. Heat Transport
7. Undergraduate thesis
8. Repetitious assignments and tasks
4. What MATLAB has been used for:

- Develop cyber-physical systems
- Remote search and rescue
- Self-sufficient highways
- Efficient clean energy
- Launching with automated code
- Robots performing life-saving tasks
- Improvement of heart transplant outcomes
- Predict weather
- Eliminate jet lag
- Detect toxins
- Dissolve gridlocks
- Identify cybercriminals
- Purify water
- Repair genes
- Sequester carbon
- Grow nano skin
- Create biofuel
- Rewire the brain
- Explore mars
- Deep Learning
- 3D Modeling and Simulations
- AND SO MUCH MORE....
Questions?
Because you attended this workshop, if you want your name entered in a drawing for a Book Scholarship at the end of the Fall semester, please complete our feedback:

https://ess.unm.edu/events/event-feedback.html