Program Design

ENGR 1181
MATLAB 11
MATLAB Program Design in Real Life

Complex manufacturing processes require careful logic mapping to determine what actions should be taken and when to produce a product. Often in automotive manufacturing, the control of robots is carefully planned and timed with flowcharts at each stage of the welding process.
Today's Learning Objectives

- After today’s class, students will be able to:
  - Explain the significance of the planning stage in computer problem solving.
  - Solve complex MATLAB problems involving all previously used concepts.
  - Construct flow charts to develop code.
Algorithms

- Algorithms are a step by step plan
- Consider every step that’s necessary to complete a task or solve a problem
- Useful tools for problem solving (DR. PIE!)
- They will make programming easier and less time consuming 😊
Algorithm Exercise

- You will work with your classmates to write a step-by-step procedure to solve a problem or complete a task.
- You will need to make many assumptions
- Consider every small step or detail
Algorithm Example

The Task: Have a person fill a bottle with stones.

- Start by listing assumptions
  - A bottle is present
  - Stones are present
  - ...
  - ...
  - ...
Algorithm Example: Assumptions

- Assumptions
  - The bottle is present
  - The stones are present
  - There are enough stones to fill a bottle
  - The bottle is empty/not full
  - Some/all stones will fit through the opening
  - ...?
Algorithm Example: The Steps

With your team, write your algorithm (~10 steps):

- Set the bottle near stones
- Make sure bottle is upright
- ...
- ...
- Hint, think like a machine!
Algorithm Example

- Trade algorithms with another team
- Follow their directions EXACTLY
- See how well it works!
Algorithm Example

- Set bottle upright near stones
- Determine if any stones are left
- Pick up one stone
- Determine if stone fits
- Put stone in bottle
- Determine if bottle is full
Flowchart Example

- Flowcharts help us visualize our algorithm/program
- DR. PIE: Represent
- It’s good practice to make a flowchart before writing any program. It will save you lots of time!
Flowchart Example

Start

Any Stones left? (Yes/No)

Yes

Get Stone

No

Discard Stone

Does Stone Fit? (Yes/No)

Yes

Put Stone in Bottle

No

Is Bottle Full? (Yes/No)

Yes

End

No
Important Takeaways

- Programs require logic and information
  - Flowcharts map this flow and set the foundation for an efficient program

- Machines don’t know anything unless they are told exactly what’s needed
  - Think like a machine when programming!
  - Ex: Machines don’t know a bottle is upright.
What’s Next?

- Review today’s Quiz #11
- Open the in-class activity from the EEIC website and we will go through it together.
- Then, start working on MAT-11 homework.