

EE 105 Project 1

Due on Gradescope, October 2 2024

Problem 1: Matlab warmup

Follow the prompts in the file `warmup.m` to complete it.

Problem 2: Cruise control (Matlab)

This problem is intended to give you some early experience thinking about controlling things. There is not a single “right” answer, and I don’t expect you to use any formal control systems techniques in your solution (we haven’t learned those yet!). We’ll discuss the results and strategies in class, and use these to build intuition for formal derivations later.

Your job is to develop a cruise control algorithm for a simulated car (very roughly modeled on my Subaru Impreza), by completing the function in `cruise.m`. The simulation uses a discrete-time model: at each time step, the simulator calls your function with the current and desired velocity, and your code calculates how much gas to give the car.

```
function gas = cruise(desiredSpeed, currentSpeed)
    % Your code goes here
end
```

A few things to note:

- The `simcruise` script simulates the car dynamics and produces a plot of the resulting speed. You’re welcome to modify it for your own testing.
- In the simulation, the desired speed may go up and down, and the car may go up or down an incline. The existing code (and included CSV file) is one example, but we’ll test it against other motion profiles when grading.
- The cruise control doesn’t apply the brakes, so the only way to slow down is to simply let off the gas. Adaptive cruise control is a problem for another day...

What to turn in

You should upload the following on Gradescope:

- Completed `warmup.m` code file
- Completed `cruise.m`
- A file called `README.txt` with a paragraph or two describing your cruise control algorithm. What did you prioritize? What things did you attempt or tune to arrive at your solution? What could still be improved?

There will be an autograder which scores your code. The warmup will be graded on correctness; the cruise control part will be graded for completion as long as you gave it a reasonable effort.

Note that the autograder will use Octave (an open-source MATLAB clone) to run your code, so it’s possible that it’ll choke if you use any obscure MATLAB stuff that isn’t supported in Octave. I won’t penalize you for this.