

CruiseAuto Project – Milestone 1A

INSTRUCTIONS: Data Handling and Visualization Brainstorming

Introduction

General Instructions

Read this document carefully. It provides you with all the requirements needed to complete the M1A Answer Sheet and any coding tasks. You are responsible for following all instructions in this document to complete your work. Use professional language in all written responses. [See EPS01 for guidelines \[link\]](#). You will submit all deliverables to Gradescope.

Using & Citing External Resources

When external sources are used, each must be properly cited with (1) an in-text citation referenced in the body of the text and (2) a full citation in *Part 5. References* of the M1A Answer Sheet for each part of this milestone document. [Use APA 7th style \[help link\]](#). **External sources will be required for evidence-based justifications in Part 3.**

Milestone 1A Context

A key aspect of coding is ensuring that a program can be used for multiple cases/reasons. So far in the course, you have been provided with one dataset for each problem. In this project, you will be challenged to develop an algorithm that works for datasets of multiple sizes. This allows for multiple tests and protocols to be evaluated equally without having to rewrite the code/program for each new type of test. This is crucial in the automation process to ensure quick, easy, and reliable testing.

This project can be completed using only MATLAB commands that have been taught or used in class materials; however, MATLAB has a huge library of built-in functions that can be very useful. In future milestones, you will be able to utilize these functions to fine tune your algorithm, **but in this milestone, you are only to use functions learned in class.**

Milestone 1A Instructions

Part 1: Assignment Header

Complete the following on Page 1 of the M1A Answer Sheet.

Team Information

The assignment header must contain the section and team ID, team member names, and Purdue career account username for each team member in Part 1. *If you are in section 001 and team 3, your section and team ID (SSS_TT) would be 001_03.*

Programmer Role Assignments

Each team member will be responsible for writing some of the code in this project. Being the primary programmer means that you must type the code yourself. All team members will aid in completion of the answer sheets for each milestone. All team members can and should help any programmer on their team with that programmer's code, as long as the primary programmer actually types the code.

Using the descriptions below, discuss as a team and decide who will be responsible for each part of the programming. Record programmer assignments in the Programmer Number column of Part 1 on the answer sheet.

- | | |
|----------------------|---|
| Programmer 1. | Primary programmer on main function and data visualization. Your code will: <ul style="list-style-type: none">→ Produce professionally formatted figures for the final report that clearly display the data, the analysis, and its results.→ Coordinate the subfunctions so they are properly used in the main function. |
| Programmer 2. | Primary programmer on managing data noise and errors. Your code will ensure that the data are usable and will be accurate for parameter identification. |
| Programmer 3. | Primary programmer on finding the acceleration start time and the time constant. Your code will ensure proper identification of both time parameters. |
| Programmer 4. | Primary programmer on finding the initial and final speeds. Your code will ensure proper identification of both speed parameters. |

Milestone Work Report

In the Detailed Description of Work column, each person on the team should write their own description of how they contributed to this milestone. Be very detailed here. Then in the last column, your team should estimate the percentage of the work that each team member did on this milestone. **This column needs to add up to 100%.** We know this will vary on any given milestone, but one person in the team should not be doing significantly more than the others throughout the whole project. Use this column as a way for you to make sure your workload is balanced throughout the project.

Part 2. Team Problem Statement

In the project introduction assignment, each team member created an individual problem statement. As a reminder, a problem statement is a clear, concise, and complete description of a problem to be solved. It should include information on the need and the user (or a key stakeholder) without reference to a specific solution.

A good problem statement will do the following:

- Clearly refer to a client
- Clearly state the need, problem, or focus of the project
- Explain why this need, problem, or focus is important to solve followed by a list of specifications
- Use professional language [\[link\]](#)

The specifications must include:

- Criteria and reason(s) for each criterion (i.e., needs/wants)
- Constraints and reason(s) for each constraint (i.e., required/must-haves)

In Part 2 of the M1A Answer Sheet, combine your individual problem statements into a single team problem statement.

Part 3. Brainstorm & Evaluate Coding Processes Using Experimental Data

Part 3a. Approaches to Data Management

CruiseAuto will provide your team with multiple sets of data throughout the project to use to help evaluate the performance of the ACC with the new tires. These data sets will range from singular tests of each car to multiple tests for each car and tire type. Each dataset will contain a multiple of 3 sets of data (1 for each car) but may include up multiples of 9 (1 for each car and tire type). Your team's program should be designed such that it is flexible enough to handle various different sizes and produce outputs for each car type and/or season type.

In Part 3a of your M1A Answer Sheet, brainstorm and record two approaches for importing these various data sets and assigning them to variables/managing them throughout your program. Your brainstorming may include words, flowcharts, or sketches, but should not include MATLAB code. Then answer the corresponding questions. You will need at least one citation for each evidence-based justification of your approach. Include any external sources, cited in APA 7th Edition style, in *Part 5. References* on your M1A Answer Sheet.

Part 3b. Approaches to Data Visualization

Knowing that you will be working with several datasets throughout the project, your team should discuss how to best visualize these datasets. Your team should strive to accurately present the data in a meaningful way that allows for insights to be drawn in respect to each type of data you are analyzing as this will be important for M1B where you will brainstorm approaches to recognize identifying characteristics of the plots.

In Part 3b of your M1A Answer Sheet, brainstorm and record two approaches for visualizing these various data sets. Your brainstorming may include words, flowcharts, or sketches, but should not include MATLAB code. Then answer the corresponding questions. You will need at least one citation for each evidence-based justification of your approach with explicit references to MATLAB functions and coding techniques needed to translate your steps to operational code. Include any external sources, cited in APA 7th Edition style, in *Part 5. References* on your M1A Answer Sheet.

Part 4. Skeleton Program

To aid with data handling through your program in the upcoming milestones, your team should create:

- One main function with no inputs or outputs named *M1A_main_SSS_TT_login.m*
- Three subfunctions with one input and one output each named *M1A_sub#_SSS_TT_login.m*

Your main function should call each of the three subfunctions and pass the data set into and out of each subfunction to ensure a working skeleton model of your program. Within each subfunction, print the following statement to the command window:

"Data successfully passed to subfunction [#] programmed by [Student Name]".

Copy and paste your Command Window output for each subfunction into the Part 4. Skeleton Program portion of your M1A Answer Sheet.

Submitting your Deliverables to Gradescope

Once you have completed each of the parts above, you will submit all of your deliverables to the associated Gradescope assignment as a team.

1. Save the answer sheet as a PDF named M1A_AnswerSheet_SSS_TT.pdf where SSS is your section number (e.g., 001 for section 001) and TT is your team number (e.g., 07 for team 7).
2. Select one person to submit all files for the team. They should log into Gradescope and submit all these files together to the M1A assignment:
 - a. M1A_AnswerSheet_SSS_TT.pdf
 - b. M1_main_SSS_TT_login.m
 - c. M1_sub2_SSS_TT_login.m
 - d. M1_sub3_SSS_TT_login.m
 - e. M1_sub4_SSS_TT_login.m
3. Select all team members for the group assignment. [\[Help Link\]](#).
 - a. Each team member should confirm that they are part of the submission. Everyone received an email when they were added. You will lose points if you do not include all teammates in the submission.
4. You will see “Autograder” information when you view your submission. Select “Code” in the upper right. That will show all your submission files. The autograder feature is not enabled for this project.
5. After submission, distribute the submitted files to all team members. Ensure all members of the team have copies of the submitted files.

It is important to note that if you need to resubmit anything for any reason, you must resubmit ALL files for the assignment. Gradescope will allow for multiple submissions up until the due date. The person who originally submitted should be the one to resubmit. If someone else resubmits, it can create issues where not everyone is tagged in the assignment and you will lose points.