EA413 COMPUTER PROGRAMMING FOR ENGINEERS

ASSIGNMENT

INSTRUCTIONS: All students should strictly adhere to ethical writing style. Avoid plagiarism and any form of ethical misconduct. Acknowledge, paraphrase and properly cite the reference materials used.

Note: The semester assignment will provide students with hands-on experience on Matlab programming skills covered in the class.

Assignment Question

You are to assume a constant thrust and constant mass of the SATURN V rocket. NASA fires the motors at negative ***t*** and lifts off at ***t = 0***. In contrast the Russians fire the motor ***at = 0*** and lifts off at positive ***t***. Use different values of ***t*** to launch the rocket. (i.e., ***t = 5, 10, 15, …*** and so on).

1. Using the MATLAB program given in RockLaunch.m file as an example, design, build and test MATLAB codes which simulates a SATURN V rocket launch, using the constant acceleration model. Write a MATLAB script to launch the rocket specifying the initial conditions at the beginning of the program so that they can be changed. Modify the function GetAccelaration to GetConstAcceleration. The new function will be renamed as GetConstAcceleration.m file.
2. Add MatLab codes to plot a graph of the height against time, velocity against time, acceleration against time for the SATURN V rocket launch.
3. Modify the plot function to produce three figures of height, velocity and acceleration with three subplots command, plotting height in blue and velocity in green and acceleration in red colors.
4. Modify the RocketLaunch.m function to RocketLaunchH.m and GetConstAcceleration function into GetHAcceleration.m, and modify them to determine the horizontal displacement at which the rocket exceeds the speed of sound. Assume that, instead of launching vertically, the rocket launched horizontally.

Please keep in mind the following policy:

- ✓ Submit the hard copies of your work to your class representative on the due date. Also note that the file(s) of your work should be turned in by e-mail by the due date to your class representatives.
- ✓ When your work is not turned in on time, a late penalty will be given. Notice that it is 10% a day within a week, and thereafter, your score is 0.
- ✓ You may discuss problems with your friends, but all work must be done individually and

you must be able to prove that you understand everything that you hand in. **Any copied work will be given 0, for both the copied work and the work it was copied from.**

- ✓ **Ethical research is the foundation of qualitative education. The students should strictly adhere to ethical standards, avoid plagiarism and any form of ethical misconduct.**

The following should be turned in, in the form of a technical report. Remember that all the files should be immediately turned in by e-mail to your class representatives.

- ✓ - Complete source code of your program (M-Files).
- ✓ - Compile messages (screen capture)
- ✓ - Input and output data of your running test, including log messages (screen capture)
- ✓ - Documentation, including (i) explanation of your program and (ii) discussion on your validation.

Grading criteria

- ✓ Clarity: Does it clearly state what to develop/solve and what have been done?
- ✓ Originality: Is the proposed idea/solution original?
- ✓ Approach: How much are the development process and experiment environment realistic?
- ✓ Presentation/Demo: Are the presentation and demo persuasive?
- ✓ Report: Are the reports (final report) nicely organized and well presented?

Submission

Submit both the soft and hard copies of the assignment to your class representatives. The submission due date is **Wednesday 4th July, 2018.**