

Project 2

This assignment follows the standard form for a project submission. You need to include an introduction, primary discussion, and summary. Include graphs, tables, and images, as necessary, to improve the clarity of your discussion. Your project needs to be both correct and well written. Communication remains a critical component of our modern, technological society.

A few notes about format: you **MUST** use MS Word for your project and use Equation Editor for **all** mathematical symbols, e.g. $z(t) = \sin(t) + \frac{1}{\ln(t)}$.

If you have any questions about the requirements for this project, ask before you submit.

This project addresses modeling with Ordinary Differential Equations and solutions to those equations. You will solve a problem analytically and program an Improved Euler's method numerical solver. **You are required to write your own numerical methods in either MATLAB or MS Excel.** You are not allowed to use an analytic solution or numerical solver written by anyone else.

The physical model and problems are provided in the MS PowerPoint presentation entitled: Project2Description.pptx. Open the PowerPoint file and hit the F5 button on your keyboard to activate the animation. **As you review the required problems, ask questions if you encounter anything that is not clear.** A *.pdf file has been provided if you cannot open the *.pptx file.

Grading Rubric

Projects provide you with an opportunity to improve your Mathematical skills as well as your communication. For this project you will need to correctly solve the problems and effectively communicate your ideas and solutions. This assignment will be evaluated across the areas of Validity, Readability, and Fluency.

Validity – Validity corresponds to the validity of your arguments. It addresses the extent to which your method is appropriate, your calculations are correct, and your analysis is accurate.

Readability – If your written work is not readable it cannot be assessed. Since the ability to communicate Mathematics is a focal point for this class, special attention will be paid to the readability of your work.

Fluency – Mathematics is a concise and precise language, and we wish to enhance your fluency. Therefore, part of every assessment will focus on your ability to incorporate correct, established notation and terminology into your written work

Evaluation criteria	Descriptive adjectives	Scoring
Validity	quality methods, correct solutions, proper conclusions, complete reasoning	40%
Readability	organization, presentation, format, clarity, effectiveness	35%
Fluency	proper notation, proper terminology, appropriate definitions, conciseness	25%

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Course and Learning Objectives

This Project supports the following Course Objectives:

CO-3: Investigate linear systems of Ordinary Differential Equations (ODEs) and their associated solutions.

CO-4: Formulate single variable models for time dependent systems.

CO-5: Analyze the qualitative behavior of single variable, differential time models and their functional solutions.

CO-6: Synthesize several solution techniques to determine their appropriate application.