

ENGI 316 ASSIGNMENT 2

Important Notes:

- Each student will need to answer a total of 2 questions. Question 3 is common for all students, as it requires the students to make individual selections. Hence,
 - If your students number ends with an odd number (1,3,5,7,9), you will need to answer questions 1 and 3.
 - If your students number ends with an even number (0,2,4,6,8), you will need to answer questions 2 and 3.
- Any attempt for answering un-assigned questions, or cheating/copying someone else's work will be severely penalized.
- Each student should submit each file as they are (not as one single zip/rar file) (via moodle, by uploading to the related assignment section (any files sent via e-mail, will not be accepted)) containing:
 - Script files, Function files (if used), Figure files, a Word document including the screenshots of the Simulink file showing the block diagram and the related modifications, Simulink files and GUI files (.m file and .fig file)
- Before submitting these files, students should check if their files and GUI are working properly when these files are available, and should be sure that he/she uploaded all related files, as otherwise there will be no warnings on missing submissions and the non-working Simulink files and GUI's will not receive any points.

- 1) **(40p)** Construct a Simulink model to solve the following problem *for* $0 \leq t \leq 15$

$$\frac{dy}{dt} = -4 \sin(3t + 8) + 1 \quad y(0) = 2$$

Also, provide the resulting graph.

- 2) **(40p)** Construct a Simulink model to solve the following problem *for* $0 \leq t \leq 18$

$$\frac{dy}{dt} = 4 \sin(0.3t - 7) + 9 \quad y(0) = 5$$

Also, provide the resulting graph.

- 3) **(60p)** Develop a GUI that will have your student number, name, surname and department details and a list box or a drop down menu (whichever one you prefer) where users will be able to select and perform the operation they want. There will be two operations. Operation 1: Plotting a 3D plot of a function that will include cosine and exponential functions (specific to each student). Operation 2: Calculating the second derivative of a function that includes ln (natural logarithm) and square root operations in it (specific to each student). The GUI should also have an edit text where it will ask the user to enter a title for the GUI, upon entry, the title should be seen on top of GUI. The GUI should also have a button that when it is clicked, it should close the GUI.

If any student does not have access to guide option in Matlab, he/she can use various dialog boxes to perform the above-mentioned operations. In that case, the variation would be like this;

A script file that will contain related coding and dialog boxes; A dialog box or dialog boxes to show your student number, name, surname, department details and the title entered by the user, and dialog boxes that will allow the user to pick either 3D-plot or derivative related operations, and perform the operations, and a dialog box that will allow the user to close the figures automatically.