



**PAMANTASAN NG LUNGSOD NG MAYNILA**  
(University of the City of Manila)  
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COLLEGE OF ENGINEERING AND TECHNOLOGY



### **Activity #3:**

# **Inverse Laplace Transform Using Python**

Name:

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Section:

ECE 0223.1-1

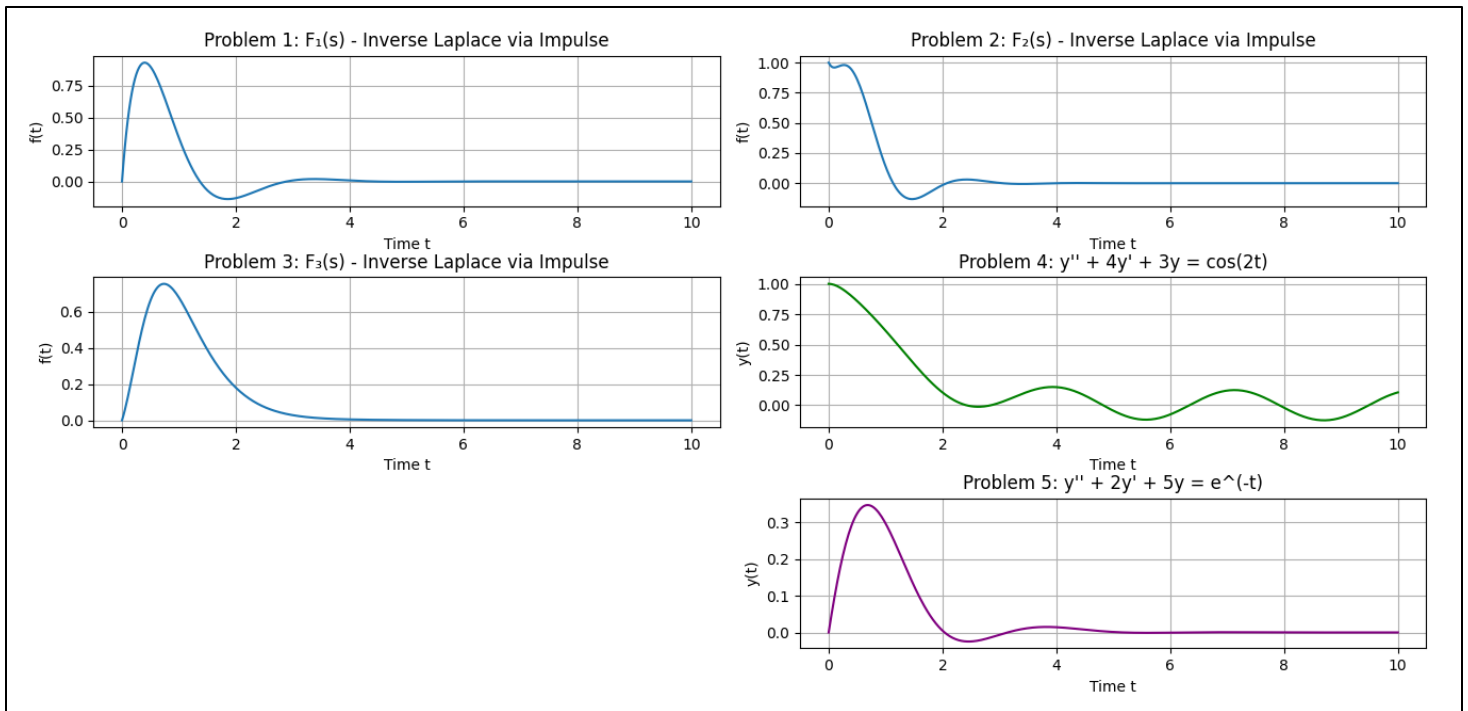
Schedule:

4 PM – 7 PM, Saturday

Date:

April 26, 2025

## Plots:



*Note: The plots shown above were generated by the Python script included with this file. Console outputs have been excluded from this document due to their length.*

## Answers to Guide Questions:

1. *What is the Inverse Laplace Transform and its significance in analyzing systems?*

The Inverse Laplace Transform is a method used to bring a function from the  $s$ -domain (frequency domain) back into the time domain. It's important because while solving problems in the  $s$ -domain is often easier, engineers need to know how systems behave over time in the real world. By using the Inverse Laplace, we can understand the actual time-based response of systems like circuits or control processes.

*2. How do time-domain responses help in understanding system stability and behavior?*

Time-domain responses show exactly how a system reacts after it's given an input. From the graph, we can tell if the system stabilizes, oscillates, or grows without bound. This information helps determine if the system is stable and how it performs, like how quickly it settles or if it overshoots. Without seeing the time-domain behavior, it would be harder to judge how good or reliable a system really is.

*3. Discuss the role of SymPy and Matplotlib in transforming and visualizing Inverse Laplace Transforms.*

SymPy makes it possible to find the Inverse Laplace Transform symbolically, meaning we get an exact time-domain equation instead of just a numerical estimate. Matplotlib, on the other hand, helps by plotting these time-domain results so we can see and analyze the behavior visually. Using both libraries together simplifies the math and makes it easier to understand complex system responses.

*4. How does the Laplace Transform simplify the solution process for differential equations in system analysis?*

The Laplace Transform turns differential equations, which are usually complicated to solve, into algebraic equations that are much easier to handle. It also automatically includes initial conditions, saving extra steps. After solving for the system's behavior in the s-domain, applying the Inverse Laplace gives us the final time-domain solution, making the whole process more straightforward and efficient.