Differential Equations

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1 Daily Quiz

2 Key Topics

Today, we use the Laplace transform to solve several initial value problems of the form

$$ay'' + by' + cy = f(t),\ y(0) = y_0,\ y(0) = y_0', \tag{1}$$

where $f(t)$ is piecewise continuous (but not continuous) and exponentially bounded. For further reading, see [1, Section 8.5].

3 Exercises

Use the Laplace transform to solve the following initial value problems.

1. $y'' - y = \begin{cases} 0 & 0 \leq t < 1 \\ 1 & 1 \leq t < 2 \\ 0 & t \geq 2 \end{cases},\ y(0) = 1,\ y'(0) = 1$

2. $y'' + 2y' + 2y = \begin{cases} 0 & 0 \leq t < \pi/2 \\ \cos(t) & \pi/2 \leq t < \pi \\ 0 & t \geq \pi \end{cases},\ y(0) = 1,\ y'(0) = 1$

References

[1] W. Trench, *Elementary Differential Equations with Boundary Value Problems*, Creative Commons Attribution-Noncommercial-Share Alike, 1st ed., 2013.