Name:

Instructor: Florin Rădulescu
Section 000 Grade:

Second Midterm 22M034

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Show all work, unsupported answers will receive no credit. No books
You **may** use your calculators and four handwritten page of formulae.

1. (30 pt)
By using the **method of the variation of constants** solve the differential equation

$$y''' - 2y'' + y' = e^t,$$

with initial condition $y(0) = 1$, $y'(0) = 1$, $y''(0) = 0$.

2. (30 pt) By using the **method of identification of coefficients** solve the differential equation

$$y''' - 2y'' + y' = e^t,$$

with initial condition $y(0) = 1$, $y'(0) = 1$, $y''(0) = 0$.

3. (40 pt total)
Consider the differential equation:

$$y" - xy' - y = 0.$$

a) (20pt) Find the reccurence relation for the coefficients of the solution as a series near 0.

b) (15 pt) By using series near 0, find the first four terms for each solution y_1, y_2 of the given differential equation.

c) (5 pt) What is the solution (first four terms of series near) in series expansion for the initial value condition $y(0) = 1, y'(0) = 0$.