

Differential Equations Midterm

9:30-11:00am, May 29, 2022

Open-textbook (but otherwise not open-note nor other resources).

Problem 1 — Separation of Variables — Logan, p. 27, #12

Comment: The t integration has been set up to be pretty straightforward.

Problem 2 — Integrating Factors — Logan, p. 42, #10

Comment: Your answer will have an integral in it (that you have to leave as an integral because $q(t)$ has not been specified).

Problem 3 — Resonance — Logan, p. 114, #2

Comments: (1) First you need to determine the values of A and B that make the particular solution work. (2) Then determine c_1 and c_2 .

Problem 4 — Cauchy-Euler Equations

Re-do Example 2.30 on p. 119, but for the equation:

$$x'' - \frac{2}{t}x' + \frac{2}{t^2}x = 0$$

Problem 5 — Reduction of Order — Logan p. 125, #2

Directions: Follow the method of Example 2.35. Once you get an equation for w , stop, and just verify that

$$e^{-2\ln t + t^2/2}$$

is a solution of your equation for w .

Comment: I'm having you stop there because I don't see any way to integrate w to get a nice result for v .