

Math 2326, Test III

Name _____

1. Find the general solution:

$$w'' + 8w' + 16w = e^{4t}$$

answer: $w(t) = C_1e^{-4t} + C_2te^{-4t} + \frac{1}{64}e^{4t}$

2. Find the general solution:

$$y''' - 8y'' + 7y' = 21$$

answer: $y(t) = C_1 + C_2e^t + C_3e^{7t} + 3t$

3. Find all 4 equilibrium points of the nonlinear system:

$$\begin{aligned}\frac{dx}{dt} &= x(-x - 3y + 150) \\ \frac{dy}{dt} &= y(-2x - y + 100)\end{aligned}$$

(0,0) is one of the equilibrium points, classify it as a source, sink or saddle point.

answer: (0, 0), (0, 100), (150, 0), (30, 40); (0, 0) is a source

4. Solve, using Laplace transforms

$$y'' - 5y' + 4y = e^{-2t}, \text{ with } y(0) = 0, y'(0) = 0$$

$$\text{answer: } y(t) = \frac{1}{18}e^{4t} - \frac{1}{9}e^t + \frac{1}{18}e^{-2t}$$

5. Find the inverse Laplace transform of $F(s) = \frac{s}{s^2 - 4s + 8}$

$$\text{answer: } f(t) = e^{2t}\cos(2t) + e^{2t}\sin(2t)$$