題號： 55
科目：常微分方程
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國立臺灣大學 109 學年度碩士班招生考試試題

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1.(25%) Solve the following differential equation.

$$y' = \frac{20(x\cos y - e^y)}{x(4x\sin y + 5e^y)}.$$

2.(25%) Find the general solution of

$$y'' + 2y' + 2y = e^{-t}\tan(t), \quad -\frac{\pi}{2} < t < \frac{\pi}{2}.$$

3.(25%) (a.) Find the general solution of the following system of equations.

$$\begin{cases} x' = 5x + y - 4z, \\ y' = 3x + 5y - 7z, \\ z' = 2x + y - z. \end{cases}$$

(b.) Find all the equilibrium solutions. Determine wether they are stable, asymptotically stable, or unstable.

4.(25%) We consider the differential equation

$$y''' + p(t)y'' + q(t)y' + r(t)y = 0, \tag{1}$$

where p, q, and r are continuous functions on an open interval I. Let y_1, y_2, and y_3 be solutions of above equation (1). Show that the Wronskian of y_1, y_2, and y_3 are either identical zero or never zero on I.

試題隨卷繳回