

系別：電機工程學系

科目：工 程 數 學

准帶項目請打「V」

X	計算機
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(1) Solve the equation

$$y' = 3x^2 - \frac{y}{x}; \quad y(1)=5 \quad (20\%)$$

(2) Solve the equation

$$x^2 y'' - 5xy' + 10y = 0; \quad y(1)=4, y'(1)=-6 \quad (20\%)$$

(3) Diagonalize

$$A = \begin{bmatrix} 7.3 & 0.2 & -3.7 \\ -11.5 & 1.0 & 5.5 \\ 17.7 & 1.8 & -9.3 \end{bmatrix} \quad (20\%)$$

(4) Find the Fourier series of $f(x)$

$$f(x) = \begin{cases} 0 & \text{for } -3 \leq x < 0 \\ x & \text{for } 0 \leq x \leq 3 \end{cases} \quad (20\%)$$

(5) Evaluate $\oint_{\Gamma} \frac{\sin(z)}{z^2(z^2+4)} dz$, where Γ is a closed path enclosing0 and $2i$ but not $-2i$ (20%)