

淡江大學 107 學年度日間部寒假轉學生招生考試試題

系別：工學院三年級

科目：工程數學

30-1

考試日期：1月13日(星期日) 第2節

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1. Solve $y' + \frac{2}{x+1}y = 3$; $y(0) = 8$. (10%)

2. Solve $y' = \frac{dy}{dx} = -\frac{2xy^3 + 2}{3x^2y^2 + 8e^{4y}}$; $y(0) = \frac{1}{4}$. (10%)

3. Solve $y'' + 16y = 0$; $y(\frac{\pi}{2}) = 1$, $y'(\frac{\pi}{2}) = -4$. (10%)

4. Solve $x^2y'' - xy' + 10y = 0$; $y(1) = 2$, $y'(1) = 5$. (10%)

5. Solve $y'' - 4y' + 13y = 4\delta(t-3)$, $y(0) = y'(0) = 0$ by Laplace transform. (10%)

6. Solve $y'' - 2y' - 8y = f(t)$, $y(0) = 1$, $y'(0) = 0$ by Laplace transform. (10%)

7. Solve the eigenvalues and the corresponding eigenvectors. (10%)

$$A = \begin{bmatrix} -1 & 0 & 5 \\ 0 & 1 & 0 \\ 0 & 0 & -2 \end{bmatrix}$$

8. Evaluate the line integral of $\vec{F}(x, y, z) = x\vec{i} - y\vec{j} + z\vec{k}$ over the straight line segment L from $P_1(1,1,1)$ to $P_2(-2,1,3)$. (10%)

9. Find the Fourier series of $f(x) = x^2$ on $[-3,3]$? (10%)

10. Let $f(x) = \begin{cases} 1 & \text{for } -1 \leq x \leq 1 \\ 0 & \text{for } |x| > 1 \end{cases}$.

Calculate Fourier integral of $f(x)$? (10%)