淡江大學九十學年度碩士班招生考試試題

系別：電機工程學系　　科目：工 程 數 學

准帶項目請打「○」否則打「×」	
計算機	字典
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本試題共 1 頁

一. $y''(x) + y'(x) - 2y(x) = 0$, $y(0) = 4$, $y'(0) = -5$. Find $y(x) = ?$ (20%)

二. $x^2y'' + xy' + (x^2 - \frac{1}{4})y = 0$, Find the general solution. (Note: one term for one basis) (20%)

三. ⓐ Evaluate $\iint_S (7x\vec{i} - z\vec{k}) \cdot \vec{n}\, dA$ over the sphere $S: x^2+y^2+z^2=4$ by integration directly, where $\vec{n}$ is the outer unit normal vector of S. (10%)

ⓑ Repeat ⓐ by using the divergence theorem. (10%)

四. $\int_0^\infty \frac{dx}{1+x^4} = ?$ (hint: apply the residue theorem) (20%)

五. Let $f(x) = \begin{cases} -k, & \text{if } -\pi < x < 0 \\ k, & \text{if } 0 < x < \pi \end{cases}$

ⓐ if $f(x) = f(x+2\pi)$, find the Fourier series of $f(x)$. (10%)

ⓑ if $f(x) = 0$ for $|x| \geq \pi$, find the complex Fourier integral of $f(x)$. (10%)