

逢甲大學104學年度碩士班考試入學試題

編號：051 科目代碼：322

科目	控制數學（含常微分方程、拉氏轉換、線性代數、傅立葉轉換、複變函數）	適用系所	自動控制工程學系	時間	100 分鐘
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※請務必在答案卷作答區內作答。

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1. Please verify whether the functions $f(x) = x^2 - 1$ and $g(x) = x^5$ are orthogonal on the interval $[-\pi, \pi]$ or not. (5%)
2. Expand $f(x) = x$, $-2 < x < 2$, in a Fourier series. (15%)
3. Find the eigenvalues and eigenvectors of $A = \begin{pmatrix} 3 & 4 \\ -1 & 7 \end{pmatrix}$. (15%)
4. Determine whether the complex function $f(z) = (2x^2 + y) + j(y^2 - x)$ is analytic or not. (15%)
5. Solve the differential equation by using the power series method. (20%)
 $y'' + 3x^2 y = 0$, $y(0) = 0$, $y'(0) = 1$.
6. Solve the differential equation. (15%)
 $y' + x^2 y = 0$, $y(0) = 2$.
7. By using the Laplace transform method, solve the differential equation. (15%)
 $y' + 3y = e^{-3t}$, $y(0) = 0$.