淡江大學九十三學年度碩士班招生考試試題

系別：航空太空工程學系　　　　科目：工　程　數　學

准帶項目請打「○」否則打「×」
○　簡單型計算機

本試題共　1　頁

1. Solve $y'' - 4y' + 3y = -3\sin(x+2)$;　　$y(-2) = 2,\ y'(-2) = 2$.　　　　　(20%)

2. Solve the following system

$x' + 4y' - y = 0,\quad x' + 2y = e^{-t};\quad x(0) = y(0) = 0$.　　　　(20%)

3. Compute

(1) $\displaystyle\int_0^{2\pi} \frac{\sin^2(\theta)}{2 + \cos(\theta)}d\theta$.　　　　(10%)

(2) $\displaystyle\int_{-\infty}^{\infty} \frac{1}{x^6 + 64}dx$.　　　　(10%)

4. Let A and B be $n \times n$ matrices such that $AB = BA$. Prove that

$$e^{(A+B)t} = e^{At}e^{Bt}.$$　　　　(15%)

5. Use the Laplace transform to solve the following boundary value problem

$$c^2\frac{\partial^2 y}{\partial x^2} = \frac{\partial^2 y}{\partial t^2},\qquad (0 < x < \infty,\ t > 0,\ c \text{ is a constant}),$$

$y(0,t) = f(t)$,

$\dfrac{\partial y}{\partial t}(x,0) = 0$,

$y(x,0) = 0$.　　　　(25%)