

淡江大學九十學年度碩士班招生考試試題

系別：物理學系

科目：物理數學

准帶項目請打「○」否則打「×」	
計算機	字典
×	×

本試題共 1 頁

1. Use the method of contour integration to evaluate

$$I = \int_0^{2\pi} \frac{d\theta}{2 + \cos\theta}$$

2. From the Fourier series of $f(\theta) = \theta^2$, $-\pi \leq \theta \leq \pi$, show that the sum

$$\sum_{n=1}^{\infty} \frac{1}{n^2} = \frac{\pi^2}{6}$$

3. Solve the following differential equation

$$\frac{dy}{dx} + (\cos x)y = \frac{1}{2} \sin 2x$$

with $y(0) = 0$

4. Solve the system of differential equations

$$\frac{dx_1}{dt} = 3x_1 + 4x_2 \quad ; \quad \frac{dx_2}{dt} = 4x_1 - 3x_2$$

with the initial conditions: $x_1(0) = 1$, $x_2(0) = 0$.

5. Find the solution $T(x, t)$, $-\infty < x < \infty$, $0 \leq t < \infty$, to the heat equation

$$\frac{\partial^2 T}{\partial x^2} = \frac{\partial T}{\partial t}$$

with the initial condition: $T(x, 0) = \delta(x)$, a Dirac delta function.