

國立勤益科技大學 102 學年度研究所碩士班招生筆試試題卷

所別：電子工程系碩士班

組別：不分組

科目：工程數學

准考證號碼：□□□□□□□□ (考生自填)

考生注意事項：

一、考試時間 80 分鐘。

二、應考人不得自行攜帶電子計算器、翻譯機或通訊設備等作答。

三、試題共七題，共 200 分，請依題號順序作答。

試題一：〈30 分〉 Solve the given differential equation by using an appropriate substitution.

$$xy^2 \frac{dy}{dx} = y^3 - x^3$$

試題二：〈30 分〉 Solve the given differential equation by undetermined coefficients.

$$y'' + 3y' + 2y = 6.$$

試題三：〈30 分〉 Given a 3×3 matrix $A = \begin{pmatrix} 1 & 3 & 5 \\ 2 & 4 & 4 \\ 1 & -1 & 1 \end{pmatrix}$. (a) Compute the determinant of A ,

(b) Compute the inverse of the matrix A .

試題四：〈30 分〉 Find Fourier transform, (a) $\mathcal{F}\{\delta(x-x_0)\}$ and (b) $\mathcal{F}\{e^{iax}\}$.

試題五：〈30 分〉 Use the Laplace transform to solve the following initial value problem

$$y'' + 4y' + 3y = e^t, y(0) = 0, y'(0) = 2.$$

試題六：〈20 分〉 Let vector $F = -i + 3j + k$, $G = 2j - 4k$. Find the angle between the vectors F and G .

試題七：〈30 分〉 (a) Use the path (C_1) and (b) Use the path (C_2) in Fig.1, to solve the following

$$\text{equation: } \int_0^P r^2 dr \text{ with } r^2 = x^2 + y^2.$$

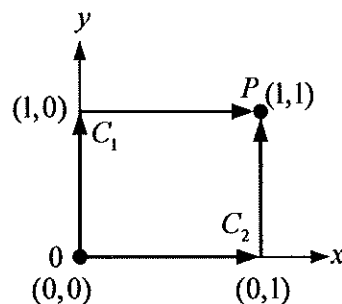


Fig. 1