國立彰化師範大學 98 學年度碩士班招生考試試題

系所：光電科技研究所　　科目：工程數學

☆☆請在答案紙上作答☆☆　　共 1 頁，第 1 頁

1. 若 z_0 在一封閉區線 C 的(a)外部，(b)內部，試計算 $\int_C \frac{dz}{z-z_0}$ (10%)

2. 若 f(z)在一封閉區線 C 的內部及 C 上皆可解析，且 z_0 為 C 的內部任一點，試證明 $f(z_0)=\frac{1}{2\pi i}\int_C \frac{f(z)}{z-z_0}dz$ (20%)

3. 求 $\frac{dy}{dx}+1=2e^{-y}\sin(x)$ 之通解 (20%)

4.

$$A=\begin{vmatrix}4 & 3 & 0 & 1\\ 9 & 7 & 2 & 3\\ 4 & 0 & 2 & 1\\ 3 & -1 & 4 & 0\end{vmatrix},\qquad B=\begin{pmatrix}1 & -1 & 1\\ 4 & 0 & -1\\ 4 & -2 & 0\end{pmatrix},\qquad C=\begin{pmatrix}-3 & 2 & 2\\ 2 & 1 & 3\\ 2 & 3 & 1\end{pmatrix}$$

(a) Evaluate the determinant A. (5%)
(b) Find the inverse of the matrix B. (10%)
(c) Find the eigenvalues and the corresponding eigenvectors of the matrix C. (15%)

5. A sinusoidal voltage $E\sin\omega t$, where t is time, is passed through a half-wave rectifier that clips the negative portion of the wave. Find the Fourier series of the resulting periodic function $u(t)=\begin{cases}0, & -\pi/\omega<t<0\\ E\sin\omega t, & 0<t<\pi/\omega\end{cases}$ (20%)