

臺灣綜合大學系統 109 學年度學士班轉學生聯合招生考試試題

科目名稱	工程數學	類組代碼	D04
		科目碼	D0491

※本項考試依簡章規定所有考科均「不可」使用計算機。

本科試題共計 1 頁

- Solve by Cramer's rule. Show details. (10 points)

$$\begin{aligned} 3x + 2y + 2z &= 1 \\ x - 3y + 3z &= -3 \\ y - 2z &= 1 \end{aligned}$$
- Find the value of line integrals when $F(\mathbf{r}) = [z, x, y]$ and $\mathbf{r}(t) = [\cos t, \sin t, t]$, $(0 \leq t \leq 2\pi)$. (10 points)
- A surface is $4x^2 + 2y^2 + z^2 = 31$, $P: (1, 1, 5)$ is on this surface. Please find unit surface normal vector. (10 points)
- $\mathbf{v}_1 = [2e^x \cos y, e^x \sin y]$ and $\mathbf{v}_2 = [\cos x \cosh y, -\sin x \sinh y]$. Please find \mathbf{v}_{1x} , \mathbf{v}_{1y} , \mathbf{v}_{2x} and \mathbf{v}_{2y} . (10 points)
- Find the inverse by Gauss-Jordan method. (10 points)

$$A = \begin{bmatrix} 1 & 8 & -7 \\ 0 & 1 & 3 \\ 0 & 0 & 1 \end{bmatrix}$$
- Solve by the Laplace transform. (15 points)

$$y(t) + \int_0^t y(\tau) d\tau = 3$$
- Determine the radius of convergence. (10 points)

$$\sum_{m=0}^{\infty} (m+1)m x^m$$
- Solve the following ODE. (15 points)

$$\ddot{y} + 3\ddot{y} - 3\dot{y} - y = 2e^x - x - 1$$
- Find a general solution in terms of J_ν and Y_ν . (10 points) (Hint: Bessel function)

$$x^2 \ddot{y} + x\dot{y} + (x^2 - 9)y = 0$$