

科目：工程數學 適用：土木所一大地、水利及防災組

編號：424

考生注意：

1. 依次序作答，只要標明題號，不必抄題。
2. 答案必須寫在答案卷上，否則不予計分。
3. 限用藍、黑色筆作答；試題須隨卷繳回。

本 試 題
共 壹 頁
第 壹 頁

1. (20%) Solve the ordinary differential equation $y'' - 3y' + 2y = e^{2x} + x$ with the initial conditions $y(0) = 3/4, y'(0) = 1/2$.

2. (20%) (1) Find $\mathcal{L}\{e^{at} \cos(at - \theta)\}$

(2) Find $\mathcal{L}^{-1}\left\{\frac{2s^2 + 2s + 1}{s(s-1)(s-2)}\right\}$

3. (20%) Solve the linear system of equations

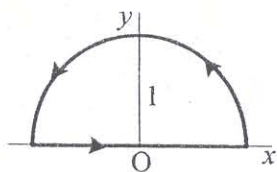
$$2x_1 + x_2 - 3x_3 + x_4 = 6$$

$$x_1 - 2x_2 + 2x_3 - x_4 = -2$$

$$x_2 - 2x_3 + 4x_4 = 6$$

$$-x_1 + 3x_2 + 2x_3 = -3$$

4. (20%) Calculate the line integral $\oint_C \vec{F} \cdot d\vec{r}$, where $\vec{F} = x^2\vec{i} + y^2\vec{j}$, and the integral path is the boarder of the area as shown in the following figure.



5. (20%) Calculate the value of the determinant:

$$\begin{vmatrix} 1 & -1 & 2 & 3 \\ 2 & 2 & 0 & 2 \\ 4 & 1 & -1 & -1 \\ 1 & 2 & 3 & 0 \end{vmatrix}$$