

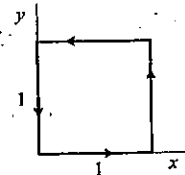
科目：工程數學 適用：土木系(結構與應力組)

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

編號：451

1. (20%) Solve the ODE  $y'' - 6y' + 9y = e^{3t} + 9$  with  $y(0) = 0$  and  $y'(0) = 0$ .2. (20%)  $\vec{F} = \sin \pi y \vec{i} + \cos \pi x \vec{j}$ , find the line integral  $\oint_C \vec{F} \cdot d\vec{r}$ , where the integral path is the border of a square shown in the figure.

3. (10%) Find the value of the determinant :

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

4. (15%) Solve the linear system of equations

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

$$x_1 - x_2 + 2x_3 - x_4 = 0$$

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

$$-x_1 + 3x_2 - 2x_3 = -1$$

5. (15%) Find the Fourier series of the function which is defined by  $f(x) = x^2$  on the interval  $[-2, 2]$ .6. (20%) Solve the PDE  $\frac{\partial u}{\partial t} = 2kt \frac{\partial^2 u}{\partial x^2}$ , where  $u = u(x, t)$  for  $0 \leq x \leq \pi$  and  $t \geq 0$ , with the boundary conditions:  $u(0, t) = u(\pi, t) = 0$  and the initial conditions:  $u(x, 0) = 2\sin 2x - 5\sin 3x$ .