

本試題是否可以使用計算機： 可使用， 不可使用（請命題老師勾選）

1) : Solve the following system of first-order differential equation : (15%)

$$\begin{cases} y_1' = -0.02 y_1 + 0.02 y_2 \\ y_2' = 0.02 y_1 - 0.02 y_2 \end{cases}$$

with initial values $y_1(0) = 0$ and $y_2(0) = 150$

2) : Using Laplace Transform to solve the Differential equation : (15%)

$$y'' + 2y' + y = e^{-t}$$

with $y(0) = -1, y'(0) = 1$

3) : Find the work done by the force $F = 2xy^3 \sin z i + 3x^2 y^2 \sin z j + x^2 y^3 \cos z k$ in the displacement around the curve of intersection of the paraboloid $z = x^2 + y^2$ and the cylinder $(x-1)^2 + y^2 = 1$ (hint ; using Stokes's Theorem) (15%)

4) : Why we need to learn Fourier series & Fourier transforms? (15%)

5) : Find the linear fractional transformation that maps $z_1 = -1, z_2 = i, z_3 = 1$ onto $w_1 = 0, w_2 = i, w_3 = \infty$, respectively. (15%)

6) : Using Gauss Elimination to solve the following system equation : (10%)

$$4X_1 + 4X_2 + 2X_3 = 0$$

$$3X_1 - X_2 + 2X_3 = 0$$

$$3X_1 + 7X_2 + X_3 = 0$$

7) : Describe the normal distribution, Binomial distribution, Poisson distribution (15%)