

元智大學 107 學年度 碩士班 招生試題卷

系(所)別：機械工程學系碩士班 組別：不分組

科目：工程數學

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●不可使用電子計算機

1. (16 %) Solve the initial value problem.

$$y' = -\frac{y}{x} \quad \text{with} \quad y(1) = 1$$

2. (17 %) Using the method of Laplace Transformation to solve the initial value problem of $y(t)$.

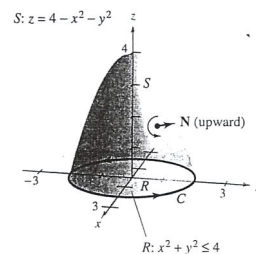
$$y'' + 2y' + y = e^{-t} \quad \text{with} \quad y(0) = -1, \quad \left. \frac{dy}{dt} \right|_{t=0} = 1$$

3. (16 %) For the matrix $A = \begin{bmatrix} 5 & -1 & 0 \\ -1 & 5 & 0 \\ 0 & 0 & 4 \end{bmatrix}$,

(1) Find the eigenvalues of A . (8 %)

(2) Find an orthogonal matrix P such that $P^{-1}AP$ is diagonal. (8 %)

4. (17 %) Let S be the portion of the paraboloid $z = 4 - x^2 - y^2$ lying above the xy -plane, oriented upward. Let C be its boundary curve in the xy -plane, oriented counterclockwise. Verify Stokes's Theorem for $\vec{F}(x, y, z) = 2z\vec{i} + x\vec{j} + y^2\vec{k}$ by evaluating the surface integral and the equivalent line integral.



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