

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)

(15%) 1. Find a general solution of $y'' + 2y' + y = e^{-x} \cos x$.

(15%) 2. Find the Laplace transform of $\cos^2 t$.

(15%) 3. Find the eigenvalues and eigenvectors of $\begin{bmatrix} 2 & 0 & -1 \\ 0 & 0.5 & 0 \\ 1 & 0 & 4 \end{bmatrix}$.

(15%) 4. Evaluate the line integral $\int_C \mathbf{F} \cdot \mathbf{r}'(s) ds$ by Stokes's theorem (clockwise as seen by a person standing at the origin), where $\mathbf{F} = [-5y, 4x, z]$; C the circle $x^2 + y^2 = 4$, $z = 1$; $\mathbf{r}' = d\mathbf{r}/ds$ is the unit tangent vector; s is the arc length of C .

(20%) 5. Evaluate the integral $\int_0^\infty \frac{\cos wx}{k^2 + w^2} dw$.

(20%) 6. Evaluate the integral $\int_{-\infty}^\infty \frac{dx}{1 + 4x^4}$.