93學年度國立成功大學 交通管理科學系 丙組 工程數學 試題 共 1 頁 第 1 頁
研究所招生考試

20% 1. Find the similarity transformation matrix that diagonizes matrix A, where

$$A = \begin{bmatrix} 5 & 4 \\ 1 & 2 \end{bmatrix}$$

20% 2. Derive with clear steps the Laplace transform for the following two functions.

a. $cos^2 t$ b. $\frac{2}{t}(1 - cos\omega t)$

20% 3. Solve the ordinary differential equation of

$$(x^2 + 1)\frac{d^2y}{dx^2} + 2x\frac{dy}{dx} + 3x^{-2} = 0$$

20% 4. For a given curve

$$\mathbf{r}(t) = 3cost\mathbf{i} + 3sint\mathbf{j} + 4t\mathbf{k}$$

find the following

a. the unit tangent vector $\mathbf{u}(t)$,

b. the tangent at $\mathbf{P}$: $(0,\ 3,\ 2\pi)$, and

c. the arc length from $\mathbf{P}$: $(0,\ 3,\ 2\pi)$ to $\mathbf{Q}$: $(-3,\ 0,\ 4\pi)$.

20% 5. Let X have the density function $f(x) = k(x - 0.9)(1.1 - x)$ if $0.9 < x < 1.1$ and 0 otherwise. Determine constant k, mean μ and variance σ^2.