國立中央大學八十四學年度碩士班研究生入學試題卷

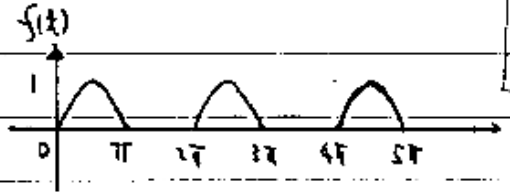
所別: 光電科學研究所 組 科目: 應用數學 共 1 頁 第 1 頁

參考用

每題 20分 共五題:

20% 1. For a function $f(t)$ is defined by

$$f(t)=\begin{cases}\sin t & 0<t<\pi \\ 0 & \pi<t<2\pi\end{cases}$$



This function is given graphically in Figure.

To find its Laplace transformation and Fourier transformation

20% 2. If A is the matrix

$$A=\begin{pmatrix}2 & 1\\ -1 & 4\end{pmatrix}$$

Find its eigenvalues and eigenvectors, what is the meaning of the eigenvalues and eigenvectors with respect to the matrix A

20% 3(a) please give the formulation of the least squares (method of), suppose the straight line

$$y=a+bx$$

should be fitted through the given points $(x_1,y_1),\cdots,(x_n,y_n)$

(10%)

(b) Let the points in the xy-plane be (5,10.0), (10,8.9), (15,8.2), (20,7.0)

(10%)

20% 4. To find the solution of the following differential equation.

$$(x^2-2xy)\,dx+(\sin y-x^2)\,dy=0$$

20% 5. Find the Fourier integral of

$$f(x)=e^{-kx} \text{ when } x>0 \text{ and } -f(-x)=f(x)$$