TUTORIAL-1

Problems based on Fourier Integral and Fourier Transform.

1. Find the Fourier integral of the function $\quad f(x) = \begin{cases} 0, x < 0 \\ 1/2 \ , x = 0 \\ e^{-x}, x > 0 \end{cases}$

2. Find the Fourier transform of $\quad f(x) = \begin{cases} sinx, \ x < 0 < \pi \\ 0, \ \pi < 0 < \infty \end{cases}$

3. Find the Fourier transform of the function f(x) defined by $\quad f(x) = \begin{cases} 1 - x^2 & if \ |x| < 1 \\ 0 & if \ |x| \geq 1 \end{cases}$.

Hence , prove that $\quad \int\limits_{0}^{\infty} \frac{\sin s - s \cos s}{s^3} \cos(\frac{s}{2}) ds = \frac{3\pi}{16}$

also show that $\quad \int\limits_{0}^{\infty} \left(\frac{\sin t - t \cos t}{t^3} \right)^2 dt = \frac{\pi}{15}$