

## Problems:

1) Find the Fourier cosine Transforms of  $e^{-|x|}$  and deduce that  $\int_0^{\infty} \frac{\cos xt}{1+t^2} dt = \frac{\pi}{2} e^{-|x|}$

2) Find the Fourier cosine transforms of  $e^{-ax}$ ,  $a > 0$ , and deduce that  $\int_0^{\infty} \frac{\cos sx}{s^2+a^2} ds = \frac{\pi}{2a} e^{-ax}$ .

3) Find FST of  $f(x) = \frac{1}{x}$ .

4) Find the FST of  $\frac{x}{x^2+a^2}$

5) Find FST of  $e^{-ax}$ ,  $a > 0$  & deduce that

$$\int_0^{\infty} \frac{s}{s^2+a^2} \sin sx ds = \frac{\pi}{2} e^{-ax}$$

6) Find the FST of  $e^{-|x|}$  & Evaluate  $\int_0^{\infty} \frac{x \sin mx}{1+x^2} dx$

7) Find FST of  $\frac{1}{x^2+1}$  and  $\int_0^{\infty} \frac{x \sin mx}{1+x^2} dx = \frac{\pi}{2} e^{-m}$ ,  $m > 0$

8) Find FST of  $\frac{x^2}{1+x^2}$

9) Find FST & FCT Find FCT of  $e^{-a^2 x^2}$  & hence find  $\int_0^{\infty} x e^{-ax} dx$

10) Find

10) Evaluate  $\int_0^{\infty} \frac{dx}{(x^2+4)(x^2+1)}$  using Fourier Transform