JK Lakshmipat University, Jaipur
Institute of Engineering and Technology

CEA-II (ES1109)
Practice Sheet IV

1. Find the Fourier tansform of the following:
   (a) $f(x) = \begin{cases} 1, & |x| < a \, (a > 0) \\ 0 & \text{otherwise} \end{cases}$
   (b) $f(x) = e^{-a^2x^2}$
   (c) $f(x) = e^{-|x|}$
   (d) $f(x) = \begin{cases} \sin x & 0 < x < \pi \\ 0 & \text{otherwise} \end{cases}$
2. Using Part 1 a) deduce the value of $\int_0^\infty \frac{\sin t}{t}$.
3. Find the Fourier-sine tansform of the following:
   (a) $f(x) = \begin{cases} 0, & 0 < x < a \\ 1 & a \leq x \leq b \\ 0 & x > b \end{cases}$
   (b) $f(x) = \frac{e^{-ax}}{x}, a > 0$, hence find Fourier sine transform of $\frac{1}{x}$.
   (c) $f(x) = 2e^{-5x} + 5e^{-2x}$
4. Find the Fourier-cosine tansform of the following:
   (a) $f(x) = e^{-x^2}$
   (b) $f(x) = \begin{cases} x, & 0 < x < 1 \\ 2 - x & 1 \leq x \leq 2 \\ 0 & x > 2 \end{cases}$
5. Solve for $f(x)$, using the following integral

$$\int_0^\infty f(x)\cos(xt)dx = \begin{cases} 1 - t & 0 < t < 1 \\ 0 & t \geq 1 \end{cases}$$