University of California Riverside, Department of ECE
EE110A: Signals and Systems
Prof. Vishwanath Saragadam Winter 2025

Homework 6

This homework is due on **Friday**, February 28th, 11:59PM.

Instructions: Please upload the homework by 11:59 PM (Pacific Time) on Canvas on the day of the deadline. If you are unable to upload it on Canvas, please hand over the homework to the TA (Xunyu Li) between 2:00 PM and 3:00 PM (Pacific Time) during TA office hours.

Problem 1 [12pts]: Find the continuous-time Fourier transform of the following signals:

a) $x(t) = \begin{cases} \cos(2\pi t) & -0.25 \leq t \leq 0.25 \\ 0 & \text{otherwise} \end{cases}$

b) $x(t) = \begin{cases} 1 & 1 \leq t \leq 3 \\ -1 & -3 \leq t \leq -1 \\ 0 & \text{otherwise} \end{cases}$

c) $x(t) = t^2 e^{-2t} u(t)$.

d) $x(t) = e^{-|t|}$.

Hint: Use the properties of the CTFT together with the examples solved in class.

Problem 2 [8pts]: Calculate the integral

$$\int_{-\infty}^{\infty} \left(\frac{\sin(\pi t)}{\pi t} \right)^4 dt$$

Hint: Use Parseval's relation.