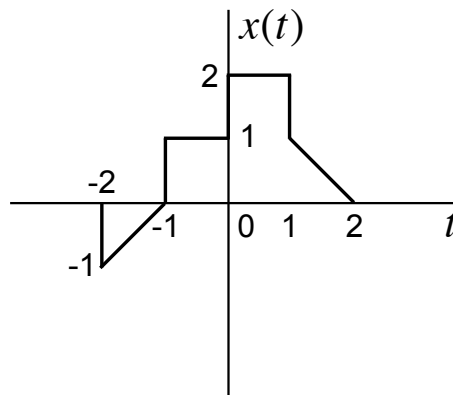


# EE3210 Signals and Systems

## Tutorial 2

**Problem 1:** A continuous-time signal  $x(t)$  is shown in the figure below.

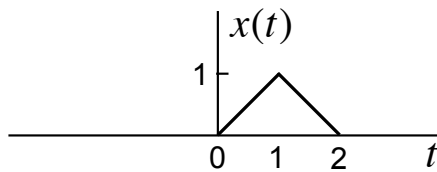


Sketch and label carefully each of the following two signals:

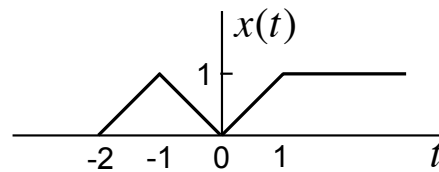
(a)  $x(4 - \frac{t}{2})$

(b)  $[x(t) + x(-t)]u(t)$

**Problem 2:** Determine and sketch the even and odd parts of the two signals depicted in the figure below. Label your sketches carefully.



(a)



(b)

**Problem 3:** In this problem, we explore several of the properties of even and odd signals.

(a) Show that if  $x(t)$  is an odd signal, then

$$\int_{-\infty}^{+\infty} x(t)dt = 0$$

(b) Show that if  $x_1(t)$  is an odd signal and  $x_2(t)$  is an even signal, then  $x_1(t)x_2(t)$  is an odd signal.

(c) Let  $x(t)$  be an arbitrary signal with even and odd parts denoted by

$$x_e(t) = \mathcal{E}\{x(t)\} = \frac{1}{2}[x(t) + x(-t)]$$

and

$$x_o(t) = \mathcal{O}\{x(t)\} = \frac{1}{2}[x(t) - x(-t)].$$

Show that

$$\int_{-\infty}^{+\infty} x^2(t)dt = \int_{-\infty}^{+\infty} x_e^2(t)dt + \int_{-\infty}^{+\infty} x_o^2(t)dt.$$