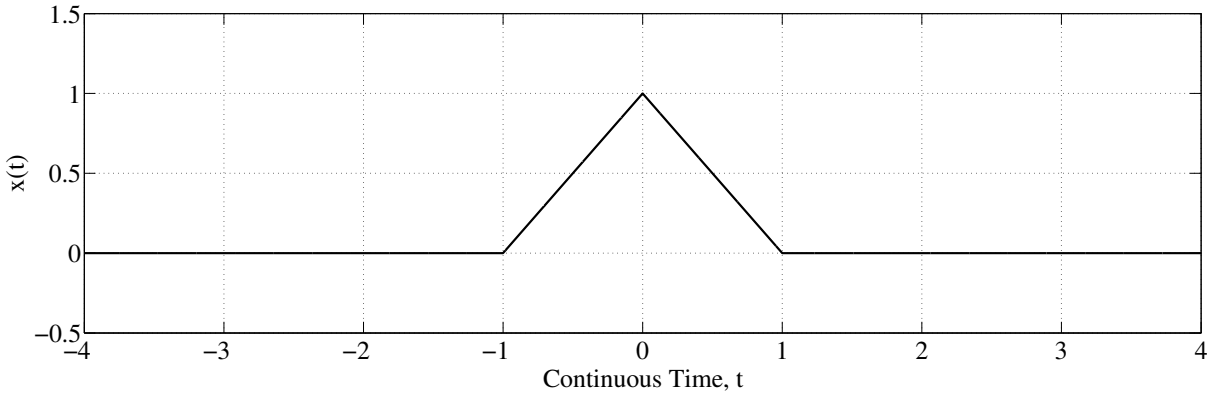
Name: SOLUTIONS

Quiz 1: 10 **/10** **ELEC 309 – Signals & Systems**

Consider the following signals $x(t)$ and $y(t)$ (on back):



(a) (5 points) Express $x(t)$ as a single (not piecewise) expression using unit step functions.

The signal $x(t)$ is given by

$$x(t) = \begin{cases} t+1 & -1 \le t < 0 \\ 1-t & 0 \le t < 1 \\ 0 & \text{otherwise.} \end{cases}$$

$$= \boxed{(t+1)\left[u(t+1) - u(t)\right] + (1-t)\left[u(t) - u(t-1)\right]}$$

$$= \boxed{(t+1)u(t+1) - 2tu(t) + (t-1)u(t-1)}$$

(b) (5 points) Evaluate

$$\int_{-4}^{4} x(t)\left[\delta(t+1) + \delta(t+0.5) + \delta(t) + \delta(t-0.5) + \delta(t-1)\right] dt.$$

$$\int_{-4}^{4} x(t)\left[\delta(t+1) + \delta(t+0.5) + \delta(t) + \delta(t-0.5) + \delta(t-1)\right] dt$$

$$= x(-1) + x(-0.5) + x(0) + x(0.5) + x(1) = 0 + 0.5 + 1 + 0.5 + 0 = \boxed{2}.$$