

ELEG 3124 Assignment # 2

1. Let

$$x(t) = \begin{cases} 2t + 2, & -1 \leq t < 0 \\ 2t - 2, & 0 \leq t < 1 \end{cases}$$

- (a) sketch $x(t)$
- (b) sketch $x(t - 2)$, $x(t + 3)$, $x(-3t - 2)$ and $x(\frac{2}{3}t + \frac{1}{2})$ and find the analytical expressions for these functions.

2. The rectangular signal $x(t) = p_2(t) = \begin{cases} 1/2, & -1 < t < 1 \\ 0, & \text{o.w.} \end{cases}$ is transmitted through the atmosphere and is reflected by different objects located at different distances. The received signal is

$$y(t) = x(t) + 0.5x(t - \frac{T}{2}) + 0.25x(t - T), T \gg 2 \quad (1)$$

Sketch $y(t)$ for $T = 10$.

3. Sketch the following signals

- (a) $x_1(t) = u(t) + 5u(t - 1) - 2u(t - 2)$
- (b) $x_2(t) = r(t) - r(t - 1) - u(t - 2)$
- (c) $x_3(t) = x_1(2t + 4)$

4. Evaluate the following integrals:

- (a) $\int_{-\infty}^{\infty} (\frac{2}{3}t - \frac{3}{2}) \delta(t - 1) dt$
- (b) $\int_{-\infty}^{\infty} (t - 1) \delta(\frac{2}{3}t - \frac{3}{2}) dt$
- (c) $\int_{-3}^2 [\exp(-t + 1) + \sin(2\pi t/3)] \delta(t - 3/2) dt$
- (d) $\int_{-3}^{-2} [\exp(-t + 1) + \sin(2\pi t/3)] \delta(t - 3/2) dt$