

Homework Assignment #2

1. Make a sketch of each of the following discrete-time signals.

- (a) $x(k) = 2u_s(k) - u_s(k-2) - u_s(k-5)$
- (b) $x(k) = \delta(k) + \delta(k-1) + u_s(k) - u_s(k-5)$
- (c) $x(k) = 2[u_s(k) - u_s(k-2)] + [u_s(k-2) - u_s(k-5)]$
- (d) $x(k) = k \sin(k\pi/3) \cdot [u_s(k-3) - u_s(k-12)]$
- (e) $x(k) = \text{Re}\{(0.4 + j0.6)^k \cdot u_s(k)\}$

2. For each of the input-output relations, determine whether the system is linear or nonlinear, time-invariant or time-varying, causal or non-causal.

- (a) $y(t) = 2x(t) + \int_{-\infty}^t 5x(\tau) d\tau$
- (b) $y(t) = 2tx(t) + \int_{-\infty}^t 5x(\tau) d\tau$
- (c) $y(t) = \int_{t-2}^{t+2} 5x(\tau) d\tau$
- (d) $y(t) = \begin{cases} \int_2^t 5x(\tau) d\tau, & t \geq 2 \\ 0, & t < 2 \end{cases}$
- (e) $y(t) = \int_{-\infty}^t \tau |x(\tau)| d\tau$

3. Use fixed-point iterations of the form

$$x(k+1) = f(x(k)).$$

to find both real solutions of the nonlinear equation

$$x^4 - 2x^3 - 1 = 0.$$