1. Sketch each of the signals

(a)
$$x(n) = u(n-3) - 2u(n-6)$$

(b) $x(n) = 2^n \delta(n-3)$
(c) $x(n) = \sum_{k=-\infty}^{\infty} (-0.9)^{|k|} \delta(n-3k)$

2. A discrete-time system is described by the following rule

$$y(n) = 0.5 |x(n)| + 0.5 |x(n-1)|$$

where x is the input signal, and y the output signal.

(a) Accurately sketch the output signal, y(n), produced by the input signal x(n) shown.



- (b) Classify the system as:
 - i. causal/non-causal
 - ii. linear/nonlinear
 - iii. time-invariant/time-varying
- 3. Repeat the previous problem for the system described by the rule

$$y(n) = 0.5 x(n) + (-1)^n \, 0.5 x(n-1)$$

4. It is observed of an LTI system that the input shown produces the output shown.



Accurately sketch the systems' output produced by the input signal:



5. An LTI system is known to have impulse response

$$h(n) = \delta(n) + 2\delta(n-1) - \delta(n-2)$$

(a) Sketch the output signal when the input signal is

$$x(n) = \delta(n+1) + 2\delta(n) + 3\delta(n-1)$$

(b) Sketch the step response of the system (output signal produced by the system when its input signal is the step function.)