

- 一、 Please explain: (1) linear and nonlinear system, (2) causal and noncausal system, (3) time-invariant and time-varying system, (4) memory and memoryless system, (5) stable and nonstable system.
- 二、 Please explain: (1) analog and digital signal, (2) periodic and aperiodic signal, (3) deterministic and random signal, (4) power and energy signal, (5) sampling theory.
- 三、 Illustrates the signals: (1)  $x(t) = u(t+2) - 2u(t-1)$ ,
- (2)  $x(t) = u(t+2) - 2u(t) + u(t-2)$
- 四、 A linear time-invariant (LTI) system with the input signal  $x(t)$  and impulse response  $h(t)$  are

$$x(t) = h(t) = \begin{cases} 1, & 0 \leq t \leq 1 \\ 0, & \text{else} \end{cases}$$

Find its output

- 五、 A discrete time LTI system is composed of five subsystems, and the overall impulse response is given as
- $$h[n] = \{(h_1[n] + h_2[n]) + h_3[n] * h_4[n]\} * h_5[n],$$
- where  $*$  is the convolutional operator. Please illustrate this system.