

...1.2.8. (B)

$$e) y[n] = \begin{cases} x[n] & n \geq 1 \\ 0 & n = 0 \\ x[n+1] & n \leq -1 \end{cases}$$

$$1) y[n_0] \text{ may depend on: } \begin{cases} n_0 = n_0 \\ n_0 + 1 \neq n_0 \end{cases} \Rightarrow \boxed{\text{not memoryless}}$$

$$2) x[n] = x[n+k] \Rightarrow y[n] = \begin{cases} x[n+k] & n \geq 1 \\ 0 & n = 0 \\ x[n+1+k] & n \leq -1 \end{cases}$$

$$y[n+k] = \begin{cases} x[n+k] & n+k \geq 1 \\ 0 & n+k = 0 \\ x[n+k+1] & n+k \leq -1 \end{cases} \neq y[n] \Rightarrow \boxed{\text{not time invariant}}$$

$$3) x[n] = \alpha x_1[n] + \beta x_2[n] \Rightarrow y[n] = \begin{cases} \alpha x_1[n] + \beta x_2[n] & n \geq 1 \\ 0 & n = 0 \\ \alpha x_1[n+1] + \beta x_2[n+1] & n \leq -1 \end{cases}$$

$$\alpha y_1[n] + \beta y_2[n] = \alpha \begin{cases} x_1[n], & n \geq 1 \\ 0, & n = 0 \\ x_1[n+1], & n \leq -1 \end{cases} + \beta \begin{cases} x_2[n], & n \geq 1 \\ 0, & n = 0 \\ x_2[n+1], & n \leq -1 \end{cases} = \begin{cases} \alpha x_1[n] + \beta x_2[n], & n \geq 1 \\ 0, & n = 0 \\ \alpha x_1[n+1] + \beta x_2[n+1], & n \leq -1 \end{cases} = y[n] \Rightarrow \boxed{\text{linear}}$$

$$4) y[n_0] \text{ may depend on } x \text{ at } n_0 + 1 > n_0 \Rightarrow \boxed{\text{not causal}}$$

$$5) |x[n]| \leq B$$

$$|y[n]| \leq |x[n]| \leq B \Rightarrow \boxed{\text{stable}}$$