1) Determine if the following signals are periodic, if so determine the fundamental period, \( T_0 \).

- \( x(t) = e^{j10t} \)
- \( x(t) = e^{j(-1) t} \)
- \( x(n) = e^{j7\pi n} \)
- \( x(n) = 3 e^{j3(n+1/2)/5} \)
- \( x(n) = 3 e^{j3(n+1/2)/5} \)

2) \( x_1(n) \rightarrow S_1 \rightarrow y_1(n) \rightarrow S_2 \rightarrow y_2(n) \rightarrow x(n) \)

\( S_1 : y_1(n) = 2 x_1(n) + 3 x_1(n-1) \)
\( S_2 : y_2(n) = x_2(n-1) + 2 x_2(n-2) \)

Determine the input – output relation of the combined system; \( S_1 \) connected in series with \( S_2 \), i.e., \( S = S_1 \cdot S_2 \)

3) Investigate if the following systems are memoryless, linear, time-invariant (TI), causal, and stable.

- \( y(t) = x(t-2) + x(2-t) \)
- \( y(t) = \int_{-\infty}^{2t} x(\tau) \, d\tau \)
- \( y(t) = [\cos(3t)]x(t) \)
- \( y(n) = x(n-2) - 2x(n-8) \)
- \( y(n) = nx(n) \)
- \( y(n) = x(4n+1) \)

4) An LTI system is considered. The response of the system to \( x_1(t) \) is \( y_1(t) \). Then find and sketch the response of the system to \( x_2(t) \) and \( x_3(t) \).