ECE 5210 quiz01

Name: SOLUTIONS

For each of the following systems, determine whether the system is stable, causal, linear, time-invariant, and memoryless. Circle all that apply.

a) $T\{x[n]\} = ax[n] + b$

Solution: The system is stable, causal, time-invariant, and is memoryless. It is linear only if $b = 0$.

The addition of a constant b makes the system non-linear unless $b = 0$. The system is causal since the output at time n depends only on the input at time n. It is time-invariant because shifting the input signal results in an equivalent shift in the output signal. The system is memoryless since the output depends only on the input value at time n.

b) $T\{x[n]\} = (\cos(\pi n))x[n]$

Solution: The system is stable, causal, linear, time-variant, and memoryless.

The multiplication by the time-varying sequence $\cos(\pi n)$ makes the system time-variant. The other properties remain unaffected.