CSE 3313 - Homework #3 – LSI Systems HW

# Causality & Stability

Test the following linear-shift-invariant systems for causality and stability

* 1. Causal. All n<0 values equal 0
  2. Stable. Total sums to 4/3
  3. Causal. All n<0 values equal 0
  4. Stable. Total sums to 3
  5. Non-Causal. Non-zero n<0 values exist due to ‘-n’
  6. Stable. Total sums to 1
  7. Non-Causal. Non-zero n<0 values exist due to ‘n+1’
  8. Stable. Total sums to 4
  9. Non-Causal. Non-zero n<0 values exist due to ‘-n’
  10. Stable. Total sums to 3
  11. Non-Causal. Non-zero n<0 values exist due to ‘-n’
  12. Non-Stable. Total sums to due to ‘’ as n → -

Sum totals were approximated with custom made desmos code. This was done so I could visualize each equation.

# Convolution

Calculate y[n] analytically using convolution. Remember, 𝑥[𝑘] ∗ ℎ[𝑘] = ℎ[𝑘] ∗ 𝑥[𝑘]

1. ,

[n] is only non-zero when its input is 0, so using the second equation above, the only non-zero value is when k=1 due to h[n].

1. ,

[n] is only non-zero when its input is 0, so using the second equation above, the only non-zero value is when k=-2 due to h[n].

1. ,

[n] is only non-zero when its input is 0, so using the first equation above, the only non-zero values are when k=-1 and k=1 due to x[n].

1. ,

[n] is only non-zero when its input is 0, so using the second equation above, the only non-zero value is when k=-5 due to h[n].