ECE113: Digital Signal Processing

Matlab Exercise 2
Due: Jan 26 11:00pm, 2022

Instructor: Prof Abeer Alwan

For each of the questions below please submit your answers, plots (if any), and your MATLAB code (if any) as a combined PDF file.

1. Convolution is an important operation in DSP. MATLAB does provide a built-in function called **conv** that computes the convolution between two finite-duration sequences.

   (a) Suppose $x(n) = \{\underline{1}, 1, 1, 1, 1\}$ and $h(n) = \{\underline{1}, 1, 1\}$, where the underline symbol "_" indicates the time index 0. Plot $y(n)$ which is achieved by $y(n) = x(n) \star h(n)$.

   (b) Solve the above problem analytically by hand and determine if the two outputs are the same.

   (c) How long is the duration of $y(n)$ and how does that relate to the durations of $x(n)$ and $h(n)$?

   (d) Suppose $x(n) = \{3, 11, 7, \underline{0}, -1, 4, 2\}$ and $h(n) = \{2, \underline{3}, 0, 5, 2, 1\}$. Plot $y(n)$ which is achieved by $y(n) = x(n) \star h(n)$. Pay attention to the starting and ending time index of $y(n)$.