EN-74 ECE: Introduction to Image Processing
Tufts University
Fall 2007
Problem Set 5
Due October 11, 2007

READING: McAndrew Chapter 5

1. Convolvolve by hand the signals \( x[n] = \{1, 2, 3, 4\} \) and \( h[n] = \{-1, 2, 1\} \)

2. Convolvolve by hand the signals

\[
x[n] = \begin{cases} 
  n & n = 0, 1, 2, 3, \ldots \\
  0 & \text{else}
\end{cases}
\quad \text{and} \quad h[n] = \{-1, 1\}
\]

Explain how/why we can think of \( h \) as a discrete form of a differentiator?

3. Figure out how to use the \texttt{conv} function in Matlab to convolve two 1D signals. Note that \texttt{conv} does not keep track of the index set of the output signal. How can you do this if you know the index sets of \( x \) and \( h \)? Verify the correctness of the first problem.