**ECE 4522/5514: DIgital Signal Processing**

# Computer Assignment (CA) No. 4: Transfer Functions

The goal of this assignment is to introduce you to frequency domain representations for filters.

Recall the general expression for a linear constant coefficient difference equation:



Using the function that you created in the previous assignment, generate the impulse response by applying an impulse signal to your filter routine. Consider these four cases:

1. $a\_{i}=0 ∀i$, $b\_{0}=1$, $b\_{1}=1$.
2. $a\_{i}=0.5$, $b\_{0}=1$, $b\_{1}=0$.
3. $a\_{1}=0$, $a\_{2}=1, b\_{0}=1$, $b\_{1}=0$.
4. $a\_{1}=0$, $a\_{2}=1, b\_{0}=1$, $b\_{1}=0.5$.

Prove that the impulse response you are getting makes sense. Compare to MATLAB.

Next, apply a chip signal (a signal whose frequency varies slowly with time). Show that output you obtain represents the frequency response by comparing your output signal to the results you get in MATLAB for the frequency response of these filters.