DIGITAL SIGNAL PROCESSING: COSC390

Jordan Hanson

January 22, 2019

Whittier College Department of Physics and Astronomy

HOMEWORK 1.1.6 - QUESTION 1

Implement a high-pass filter recursively. For the signal, add gaussian white noise to a sine-wave (or other well-defined signal of your choosing), and filter the noise so that it is visible. Recall the recursion filter formula:

$$y[n] = \sum_{k=0}^{N-1} a_k x[n-k] + \sum_{k=0}^{N-1} b_k y[n-k] \tag{1}$$

Single-pole HP filter recursion:

1. $a_0 = (1+x)/2$
2. $a_1 = -(1+x)/2)$
3. $b_1 = x$

The variable x varies from $[0, 1]$. **Turn in:** a) A plot of the un-filtered time-domain and frequency domain output, b) a plot of the filtered time-domain and frequency domain output, and c) the code.