LAB 3 Assignment

Shuaiyu Liang (sl5352)

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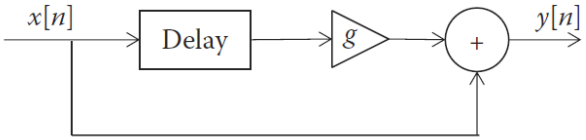
1-1. The source code of question 1 is in the package named Lab_3_ASGMNT1_1_sl5352.py

Recording of my own voice in stereo form is named the only thing that changes everything.wav

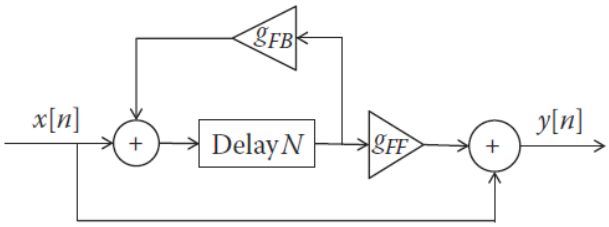
2-1. basic feedforward delay system with the delay of N samples is like the diagram below. The transfer function could be easily acquired that: $H(z) = 1 + g \times z^{-N} = \frac{z^N + g}{z^N}$



The transfer function has no poles outside the unit circle, the basic delay must be stable in all cases.

2-4. The source code for question 2-4 is in the package named Lab_3_ASGMNT2_4_sl5352.py

3-1.



The delay system with feedforward and feedback could be represented as above diagram. With differential equation as $y(n) = x(n) + g_{FF} \times d(n)$

Where $d(n) = x(n-N) + g_{FB} \times d(n-N)$ Think of

$y(n-N) = x(n-N) + g_{FF} \times d(n-N)$ we then have

$y(n) = g_{FB} \times y(n-N) + x(n) + (g_{FF} - g_{FB}) \times x(n-N)$. Then the transfer function goes like

$H(z) = \frac{z^N + g_{FF} - g_{FB}}{z^N - g_{FB}}$ .This transfer function got poles at the N complex roots of g_{FB}. The condition for making the system stable is $|g_{FB}| < 1$

3-4 The source code for question 3-4 is in the package named Lab_3_ASGMNT3_4_sl5352.py