Lecture 28

Dec. 3 - EEG 722

ROOM 178, 176, 174, 172

$$V_{OUT}(z) = \frac{z^{-1/2}}{1-z^{-1}} \cdot 2(-2V_{INT}(z)) + \frac{V_1(z)\cdot z^{-1/2} - V_2(z)}{1-z^{-1}} \frac{C_I}{C_F}$$

$$V_{OUT}(1-z^{-1}) = -2\cdot z^{-1/2} V_{INT} + V_1(z) z^{-1/2} \frac{C_I}{C_F}$$

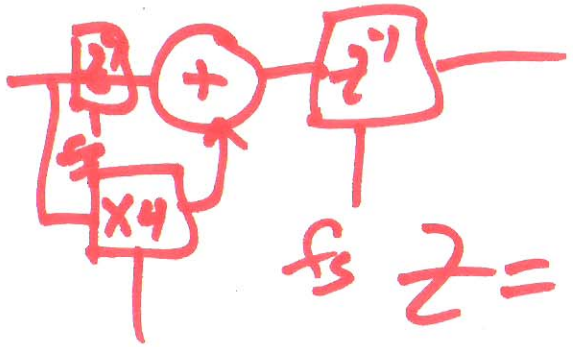
$$V_{INT}(1+z^{-1}) = V_1 z^{-1/2} \frac{C_I}{C_F} - V_2 \frac{C_I}{C_F} + V_2(z) \frac{C_I}{C_F}$$

Quizzes
H.W.
Midterm exam
End of chapter problems

Ch. 1 basic stuff

filtering

unit circle



$$\frac{Y}{X} = \frac{1 - z^{-4}}{1 - z^{-1}}$$

$$f_s \quad z = 1 + e^{j 2\pi \frac{f}{f_s}}$$

$$X_1 + X_2 + X_3 + X_4 + X_5$$

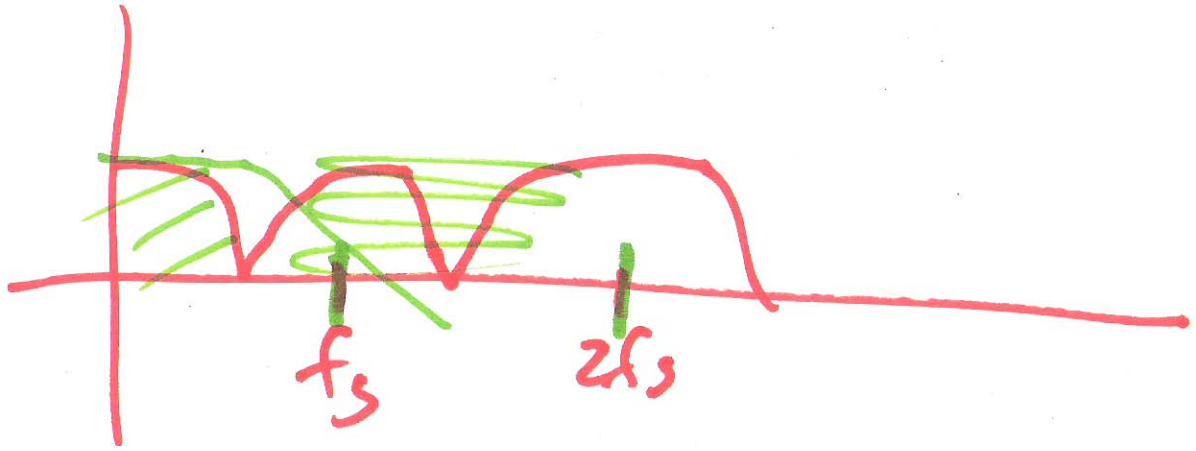
$$X(1 + z^{-1} + z^{-2} + z^{-3}) = Y$$

Ch. 32 Sampling & Aliasing

Decimation

&

Interpolation

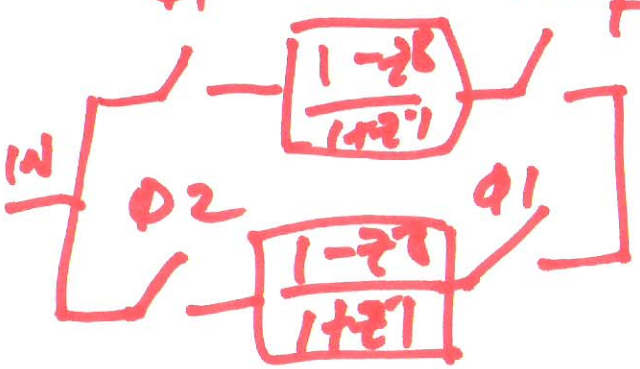


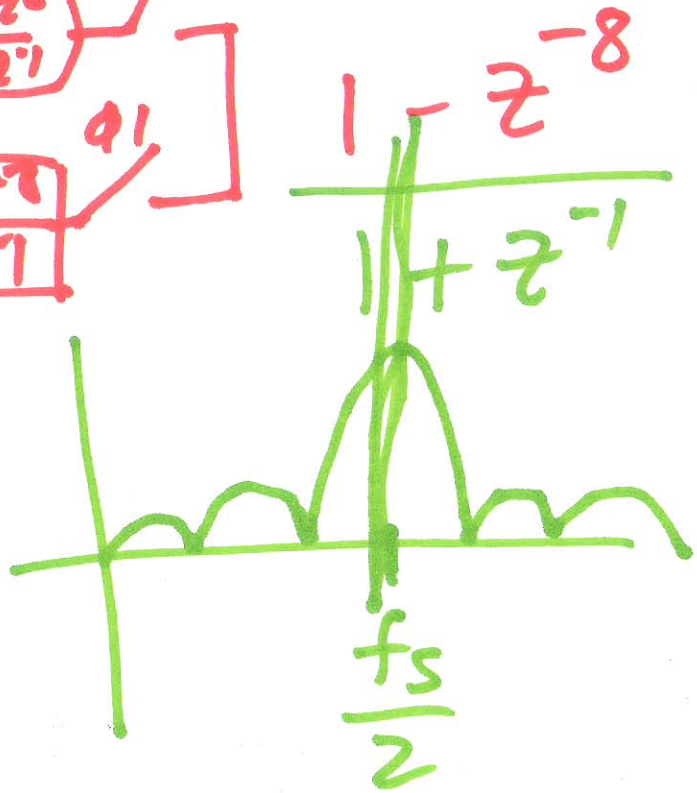
Polyphase Ch. 4 Digital Filters

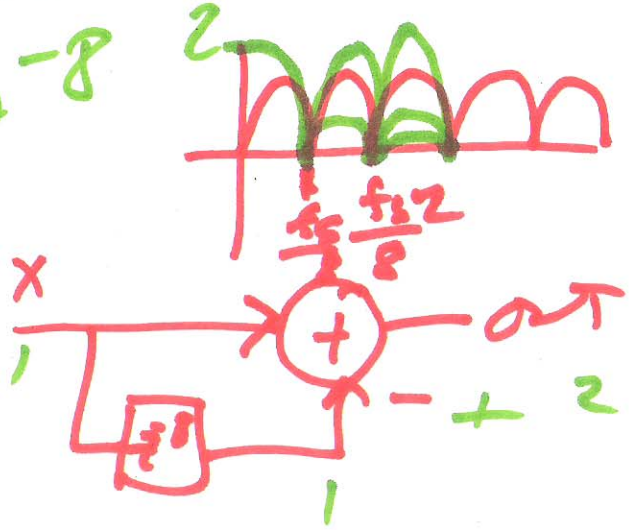
$z^1 \rightarrow z^2$ B.P. Resonators

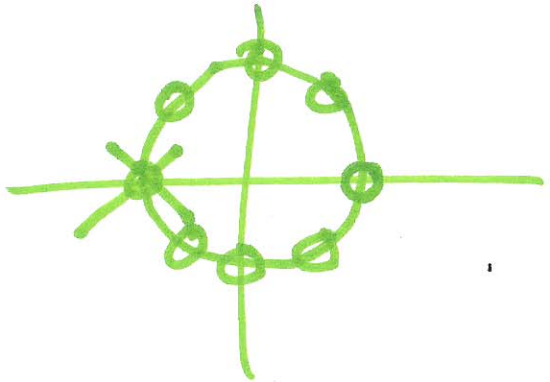
$1 + z^{-8}$

ϕ_1 ϕ_2 H.P.



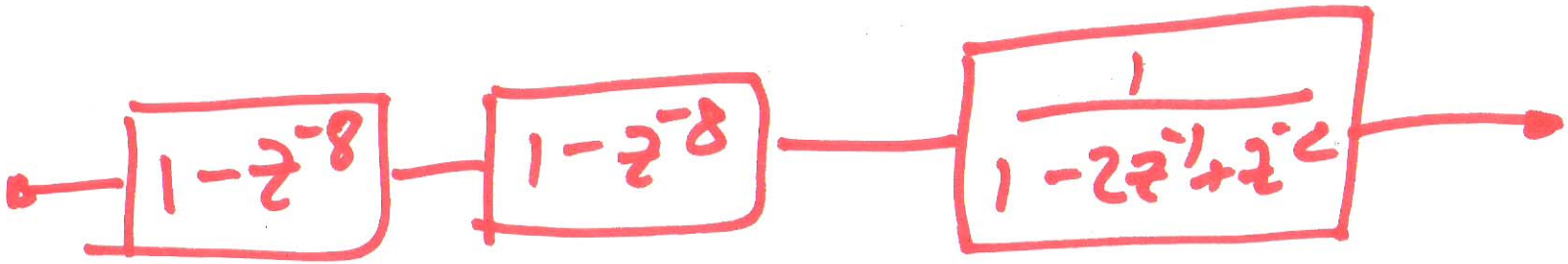






$$\frac{1}{1-2z^{-1}+z^{-2}} = \frac{Y}{X}$$

$$\frac{Y}{X} = \frac{z^2}{z^2-2z+1} = \frac{z^2}{(z-1)^2}$$

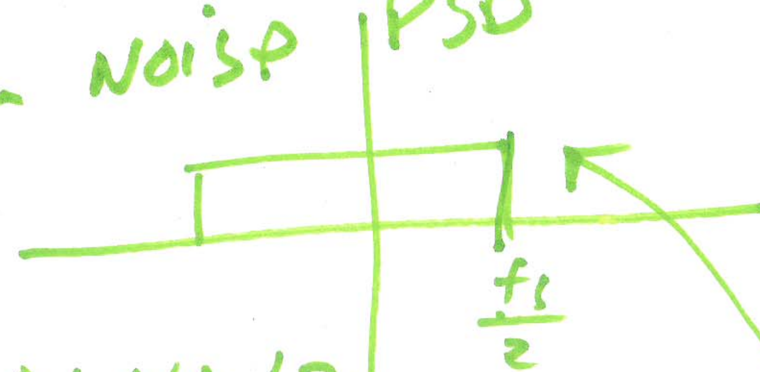


5)

NOISE - shaping

Bennett's Criteria →

QUANTization Noise



- op-amp gain
- offset
- comp. offset
- settling time
- B.W.

ENOB $6.02N + 1.76$

SNDR ←

SNR

$NTF = (1 - z^{-1}) V_Q(f)$

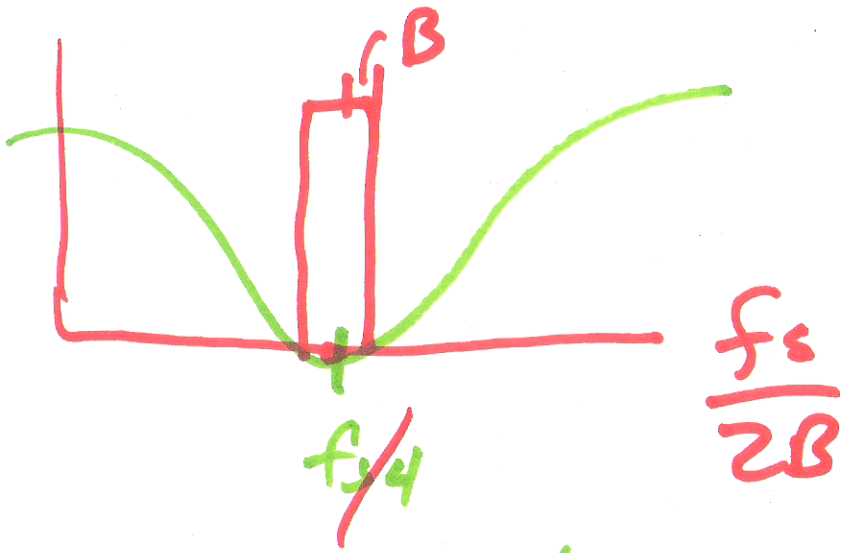
Modulation noise

topologies
- first order S.C. model
- second order mod.

Bandpass conversion

Why 2-paths are used

OSR for B.P. Conversion



Questions on the projects

B m

Suppose you have 8 1st order modulators operating in parallel. Determine the NTF And the Neff/SNR for a given B.W., B.

$$NTF\Big|_{8\text{ 1-path}} = \left(1 - z^{-1}\right)^{8} \cdot \frac{VDD}{\sqrt{12}\cdot\sqrt{f_s}} \rightarrow V_{LSB}$$