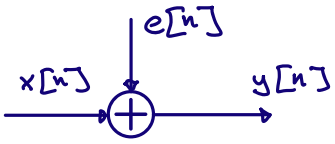
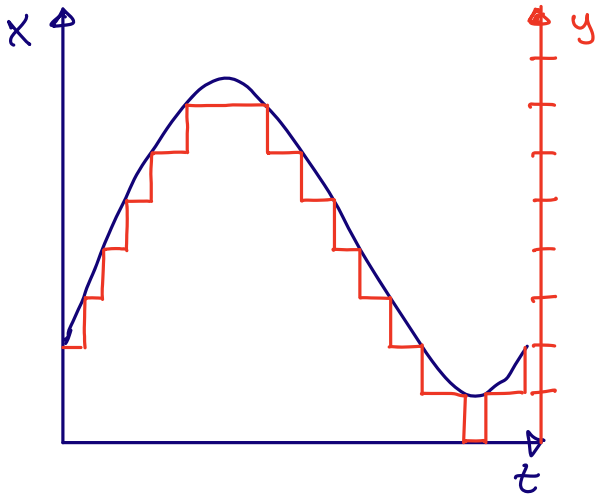
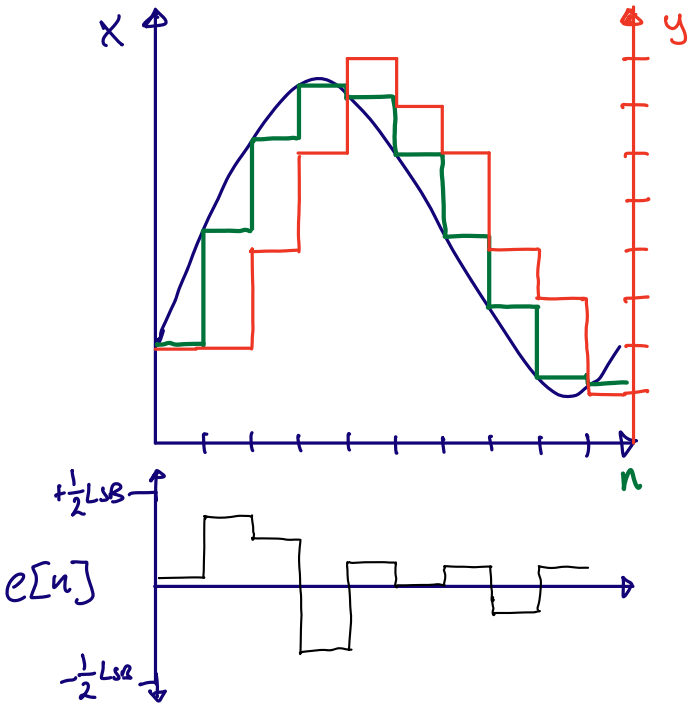
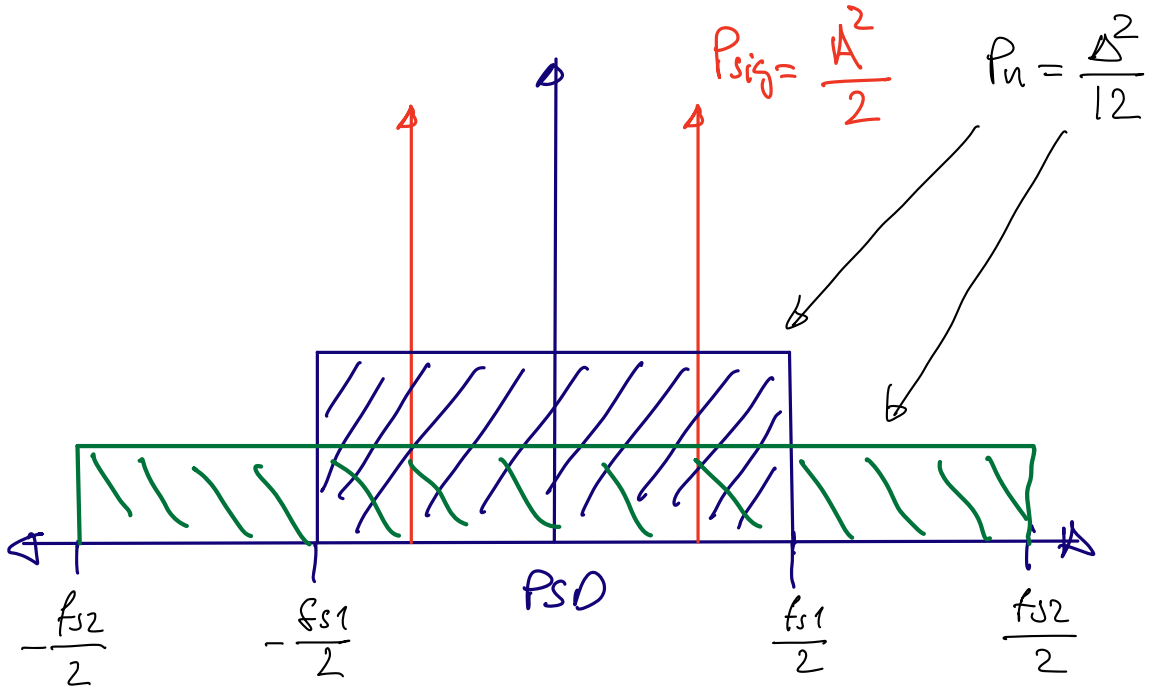

e[n]
x[n]
y[n]


x
y
t


x
y
n
+½LSB
e[n]
-½LSB



$$SQNR = 10 \log \left[\frac{\frac{A^2}{2}}{\frac{\Delta^2}{12}} \right] = 10 \log \left[\frac{A^2 6}{\Delta^2} \right]$$

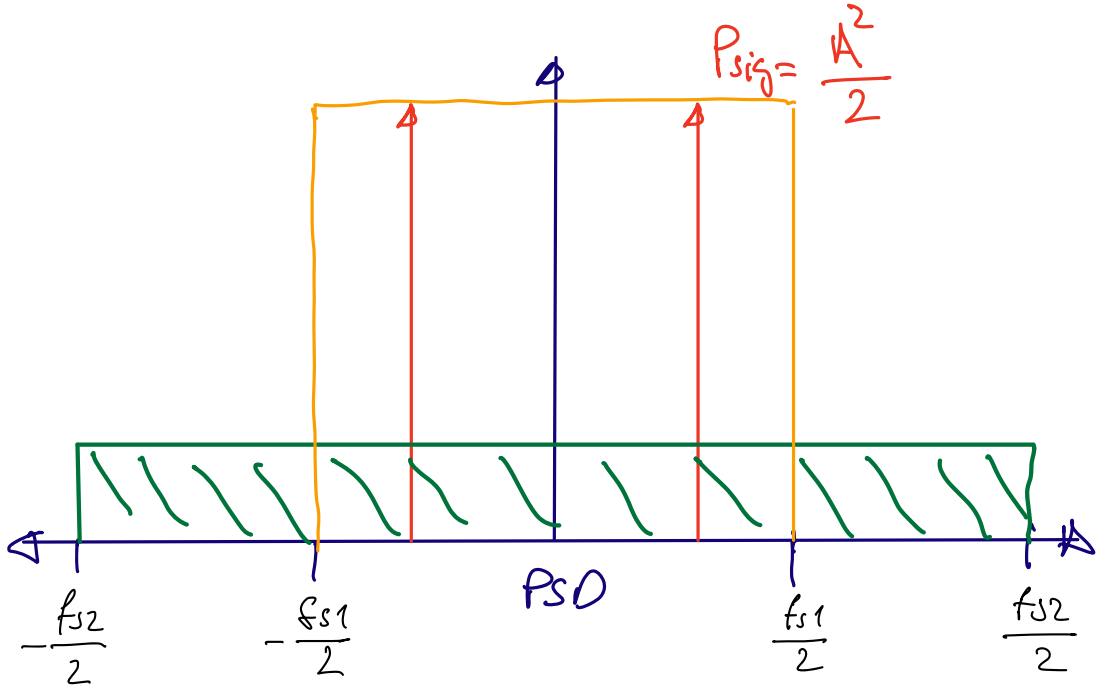
$$\Delta = \frac{2A}{2^B}$$

$$SQNR = 10 \log \frac{A^2/2}{\frac{A^2 4}{2^{2B} 12}} = 10 \log \left[2^{2B} \cdot \frac{6}{4} \right]$$

$$SQNR = 20B \cdot \log 2 + 10 \log \frac{6}{4}$$

$$= 6.02 \cdot B + 10 \log \frac{6}{4} = 6.02 \cdot B + 1.76 dB$$

$$k_X = \frac{\Delta}{\sqrt{12}} \sqrt{\frac{1}{f_s}}$$



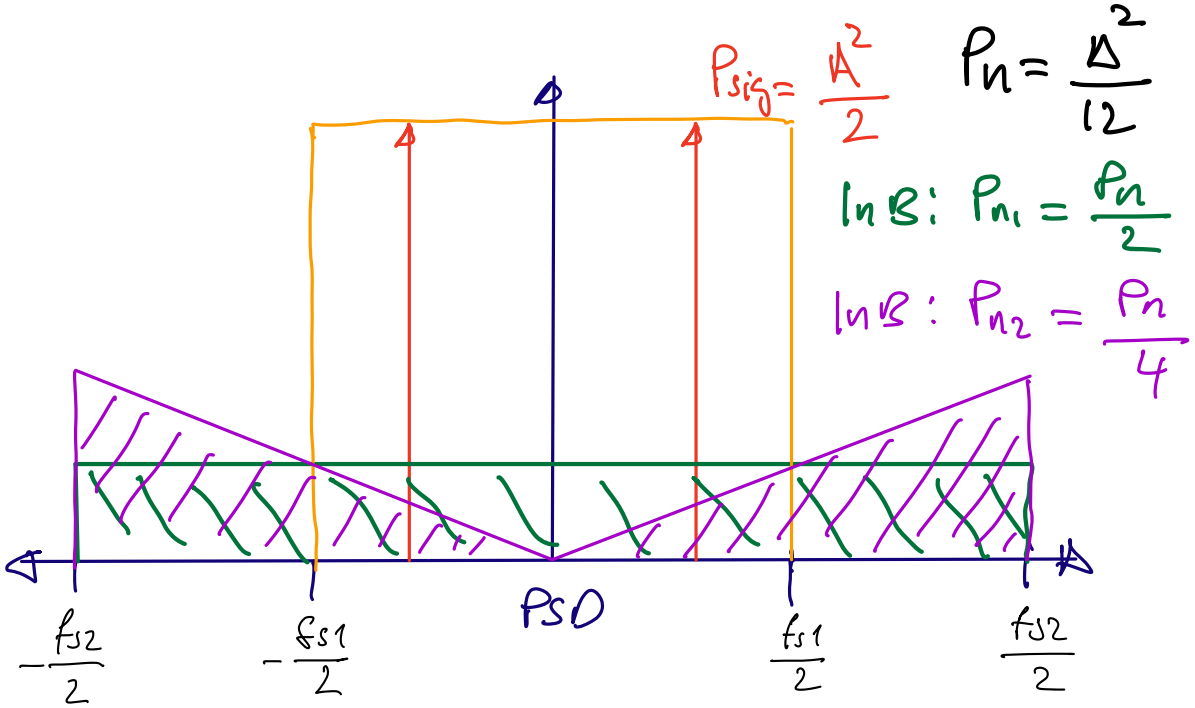
$$SQNR = 10\log\left[\frac{\frac{A^2}{2}\cdot 6}{\frac{\Delta^2}{OSR}}\right] = 10\log\left[\frac{A^2\cdot 6}{\Delta^2}\right] + 10\log OSR$$

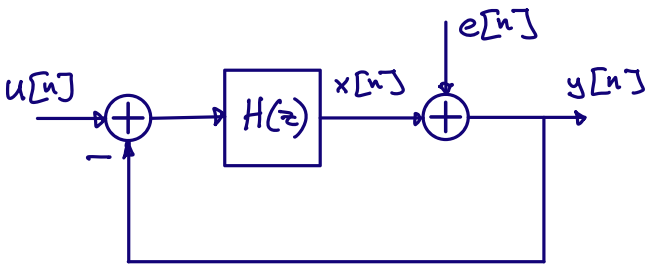
$$= 6.02\,dB + 1.76\,dB + 10\log OSR$$

$10\log 2 \sim 3\,dB$

$10\log 4 \sim 6\,dB \sim 1\text{-bit}$

OSR x 4 per bit





$$y[n] = e[n] + H(z)\left[u[n] - y[n]\right]$$

$$Y(z) = E(z) + H(z)\left(U(z) - Y(z)\right)$$

$E(z) = 0$

$$Y = H \cdot U - H\,Y$$

$$STF = \frac{Y}{U} = \frac{H}{1+H}$$

$U=0$

$$Y = E + HY$$

$$NTF = \frac{Y}{E} = \frac{1}{1+H}$$

$$Y(z) = STF(z)\,U(z) + NTF(z)\,E(z)$$

First order SD

$$H(z) = \frac{1}{z-1}$$

$$STF = \frac{1/z-1}{1+1/z-1} = \frac{1}{z} = \underline{\underline{z^{-1}}}$$

$$NTF = \frac{1}{1+1/z-1} = \frac{z-1}{z} = 1-z^{-1}$$

$$|NTF(f)| = z = e^{j\omega T} = e^{j2\pi f/f_s}$$

$$= 1 - e^{-j2\pi f/f_s} = \frac{e^{j\pi f/f_s} - e^{-j\pi f/f_s}}{2j} \times 2j \times e^{-j\pi f/f_s}$$

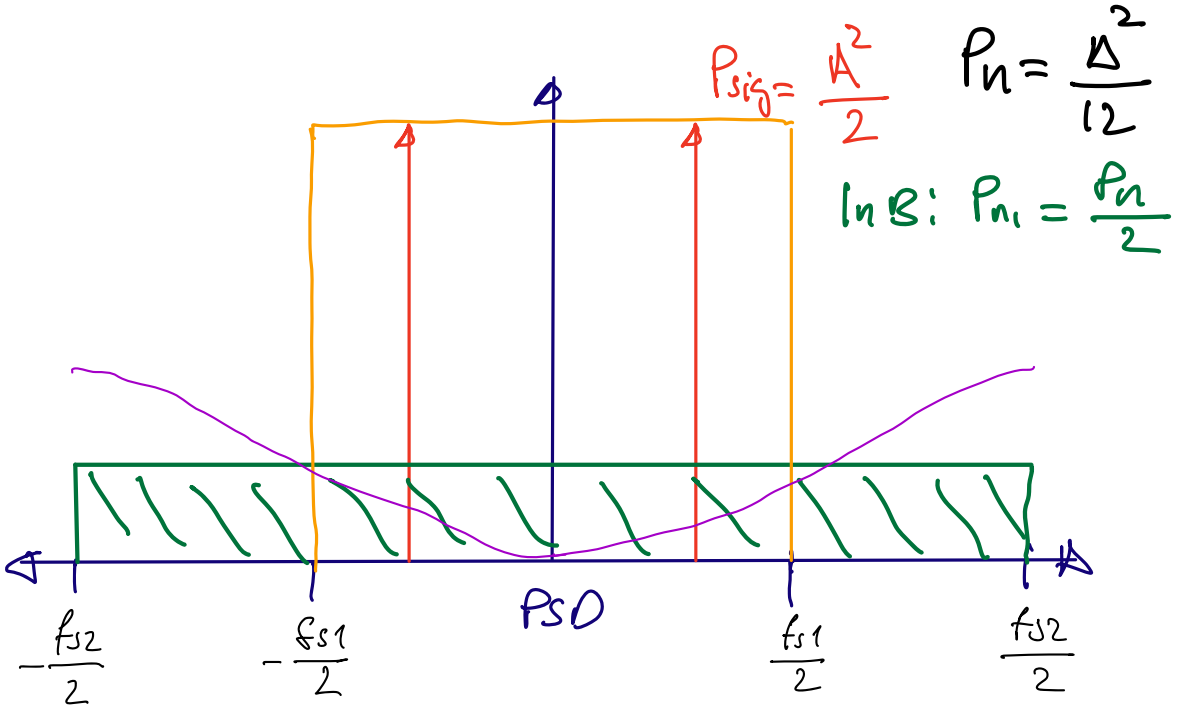
$$= \sin\left(\frac{\pi f}{f_s}\right) \times 2j \times e^{-j\pi f/f_s}$$

$$|NTF(f)| = 2\sin\left(\frac{\pi f}{f_s}\right)$$

$$P_e = \int_{-f_0}^{f_0} \frac{\Delta^2}{12} \frac{1}{f_s} \left[2 \sin \frac{\pi f}{f} \right]^2 df$$

$$\sim\sim\sim \quad \frac{\Delta^2}{12} \frac{\bar{u}^2}{3} \left(\frac{2f_0}{f_s} \right)^2 \sim \frac{\Delta^2 \bar{u}^2}{36} \left(\frac{1}{OSR} \right)^2$$

$$SQNR = 6.02N + 1.76 - 5.17 + 30 \log (OSR)$$

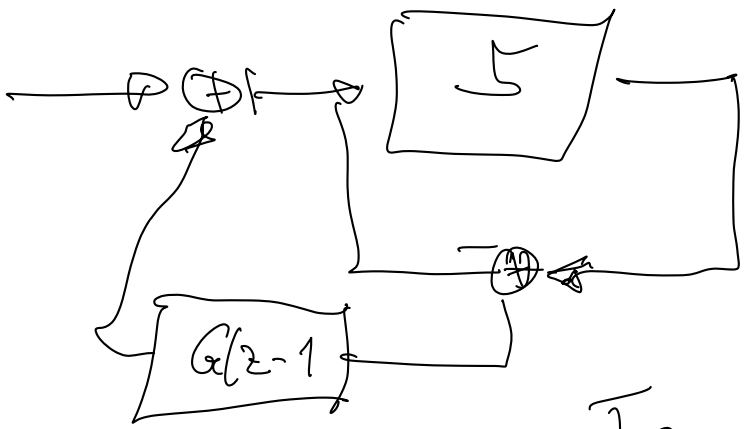


Names Bose

2 ordn =

$$SQNR = 6{,}02N + 1{,}76 - 12{,}9 + 5\log_2(OSR)$$

Error feedback

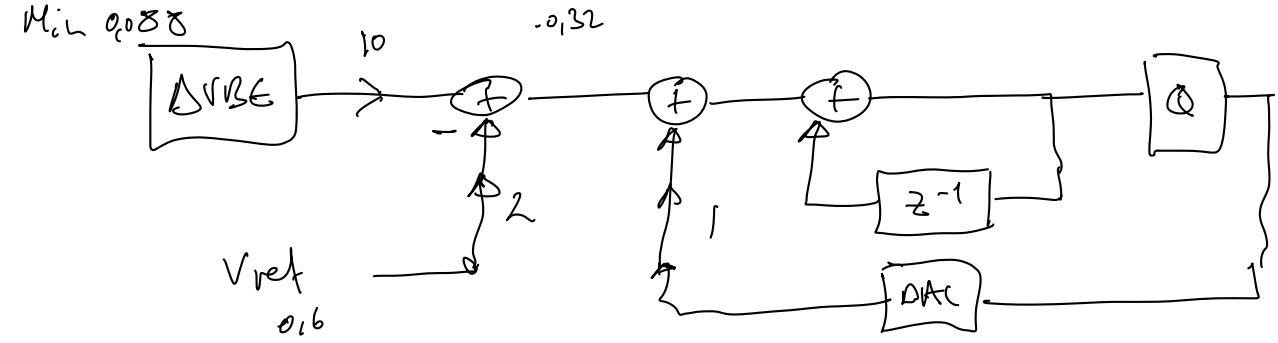


Tenes

Decimation filters?

VT - lin A		8	16	64
27,6	22	44	66	88
$\frac{kT}{q}$ = 22 @ 240K	34	68	95	136
34,5 @ 400K	D	28	35	48

Max	0,143	0,23
Med	0,120	0
Min	0,088	-0,32



MAX	156 mV	360mV	300m
Med	124 mV	40 mV	33m
Min	101 mV	-190 mV	-225m