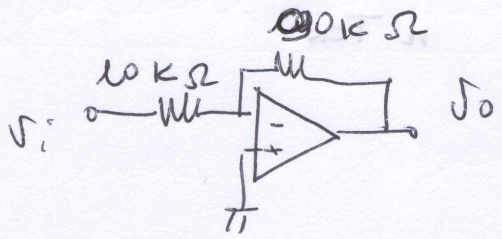
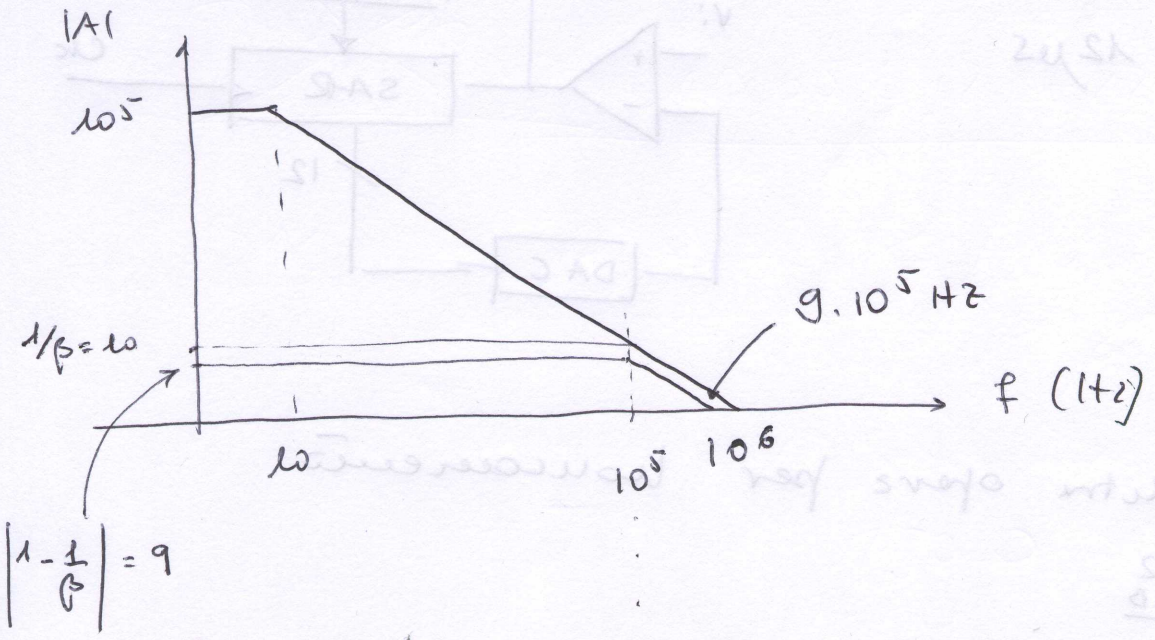
23/6/2020

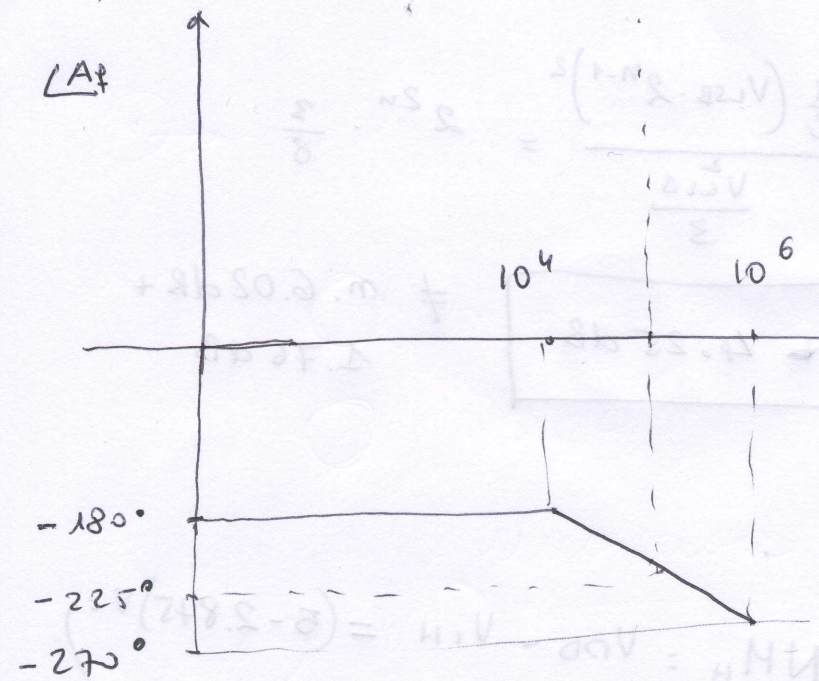
1)



$\beta = \frac{1}{10} \rightarrow \frac{1}{\beta} = 10$



$\left|1 - \frac{1}{\beta}\right| = 9$

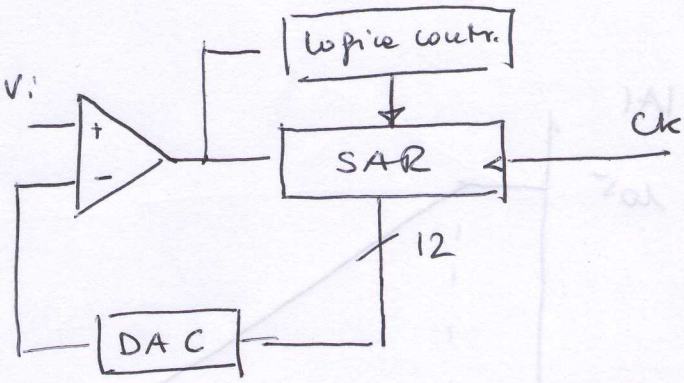


2) Tempo di conversione di un ADC di tipo SAR ad n bit è n T_{CK}

$n = 12$

$T_{CK} = 1/f_{CK} = 10^{-6}\,s$

$T_{CONV} = 12\,\mu s$



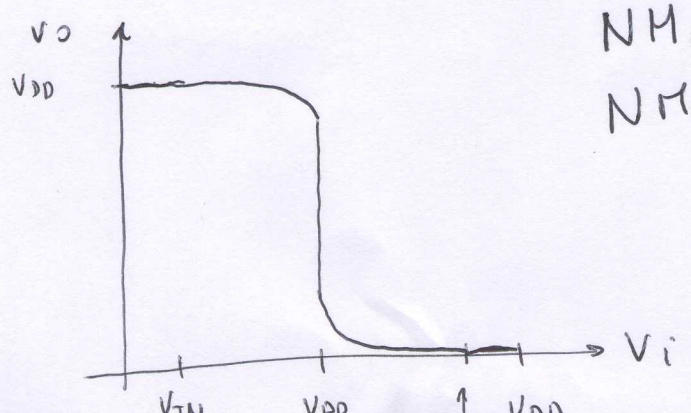
Il convertitore opera per troncamento

$$\overline{e} = \frac{V_{LSB}^2}{3}$$

$$SNR_{MAX} = \frac{\frac{1}{2}\left(\frac{V_{FS}}{2}\right)^2}{\frac{V_{LSB}^2}{3}} = \frac{\frac{1}{2}\left(V_{LSB}\cdot 2^{n-1}\right)^2}{\frac{V_{LSB}^2}{3}} = 2^{2n}\cdot\frac{3}{8}$$

$$SNR_{MAX} = n.6.02\,dB + 4.25\,dB \neq n.6.02\,dB + 1.76\,dB$$

3) Inverter simmetrico.



$NM_H = V_{DD} - V_{IH} = (5 - 2.875)V =$

$= 2.125\,V$

$NM_L = V_{IL} = NMH$

la corrente di picco si ha per $V_i = V_{DD}/2$, quando entrambi i MOS sono in saturazione

$$I_p = K_n (V_{DD}/2 - V_{Tn})^2 =$$

$$= 50 \cdot 10^{-6} \cdot (2.5 - 1)^2 \, A =$$

$$= 112.5 \cdot 10^{-6} \, A = 112.5 \, \mu A$$