

# ECE 615 CMOS Mixed-Signal



NOV. 3, 2010  
Circuit 100k/s  
Lecture 21

Using  $K$  ADC's in parallel

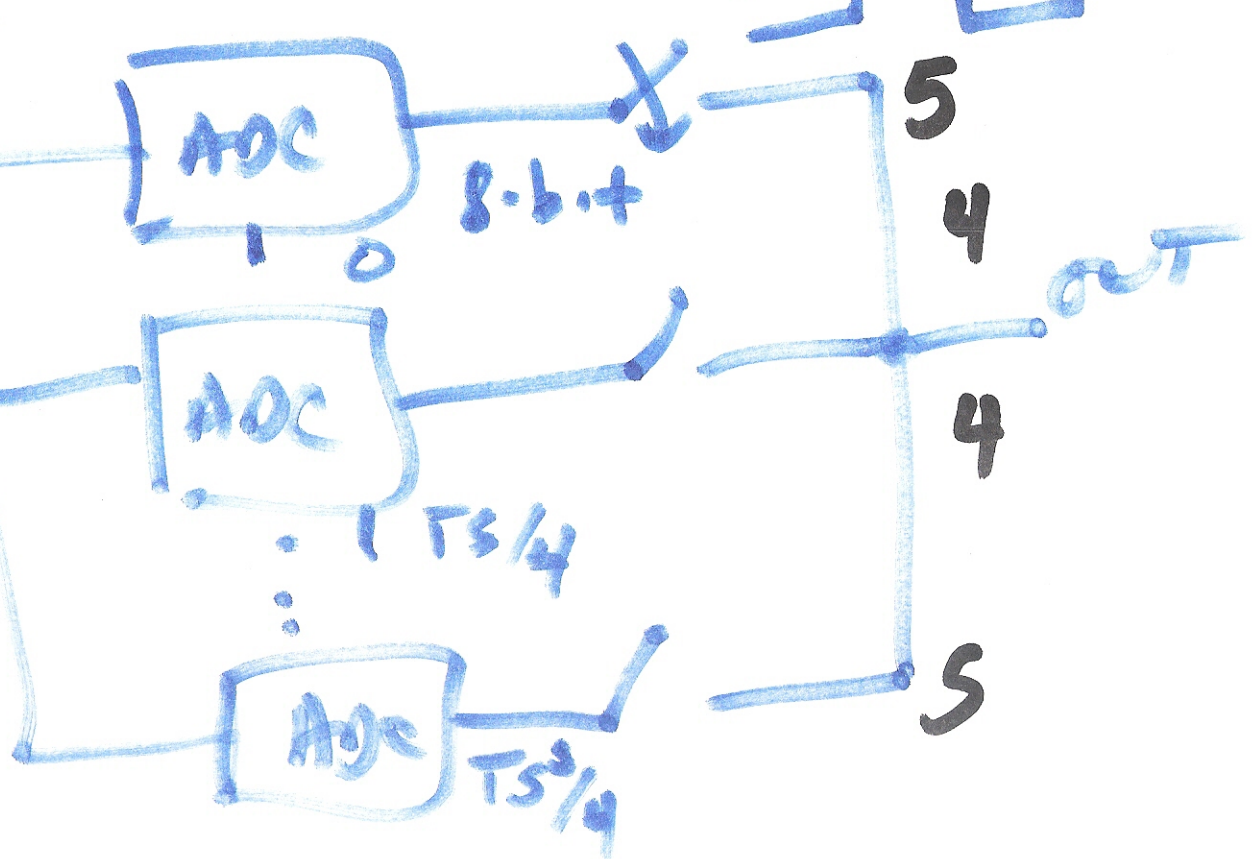
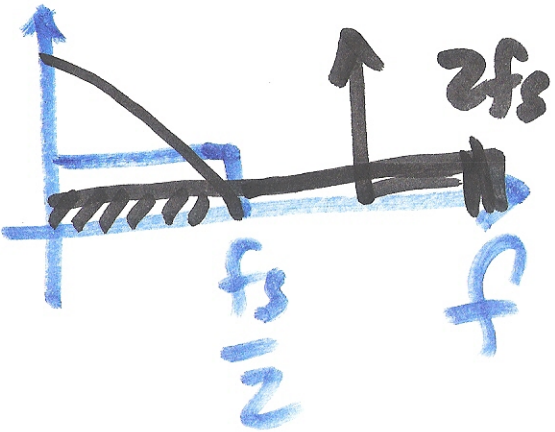
2.5V

2.502

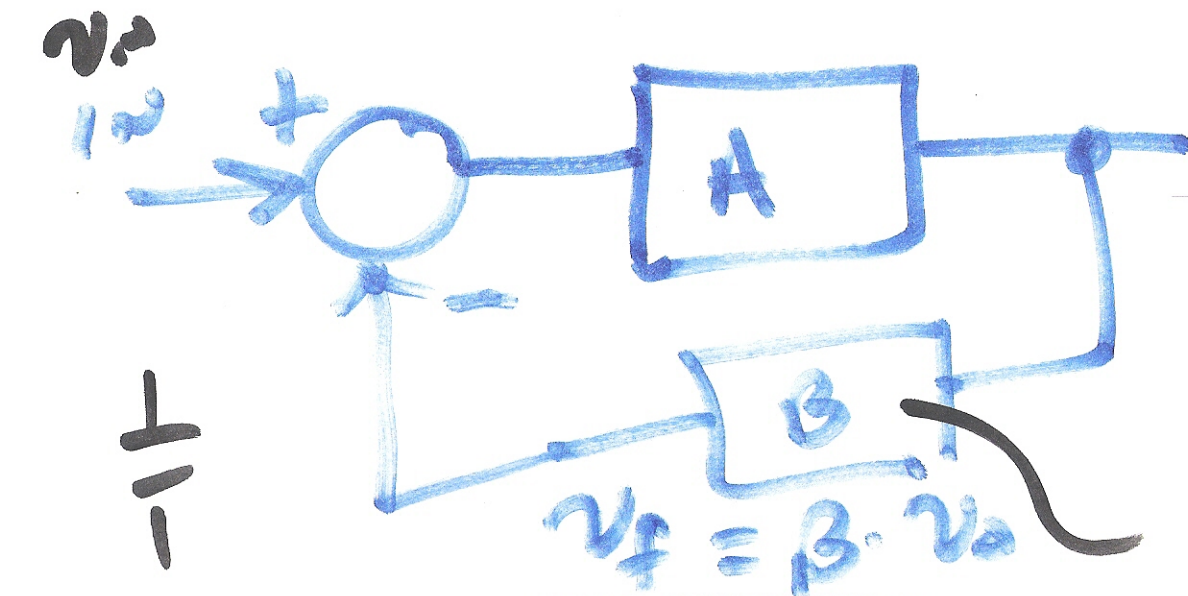
$V_{DD}$

DC

$V_{in}$



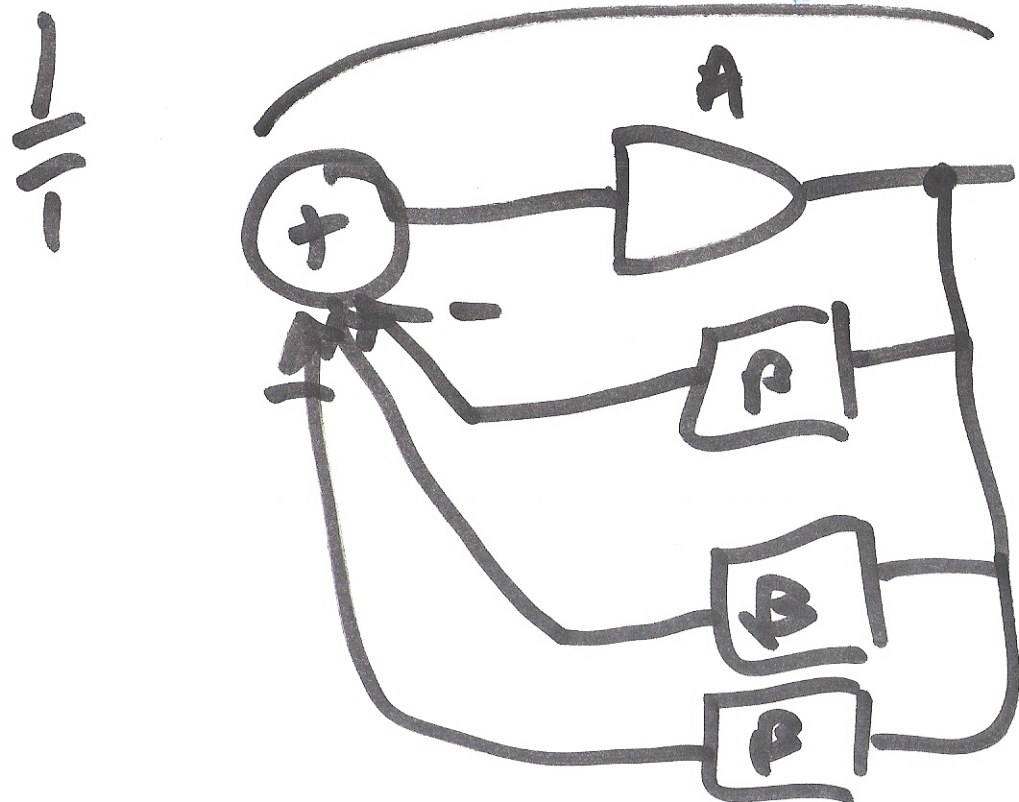
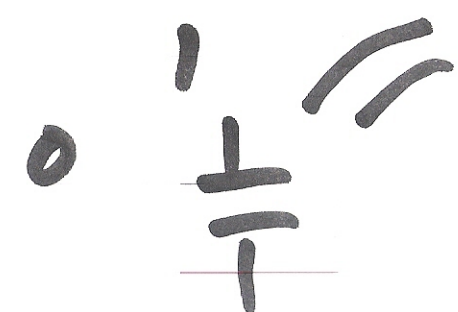
1)



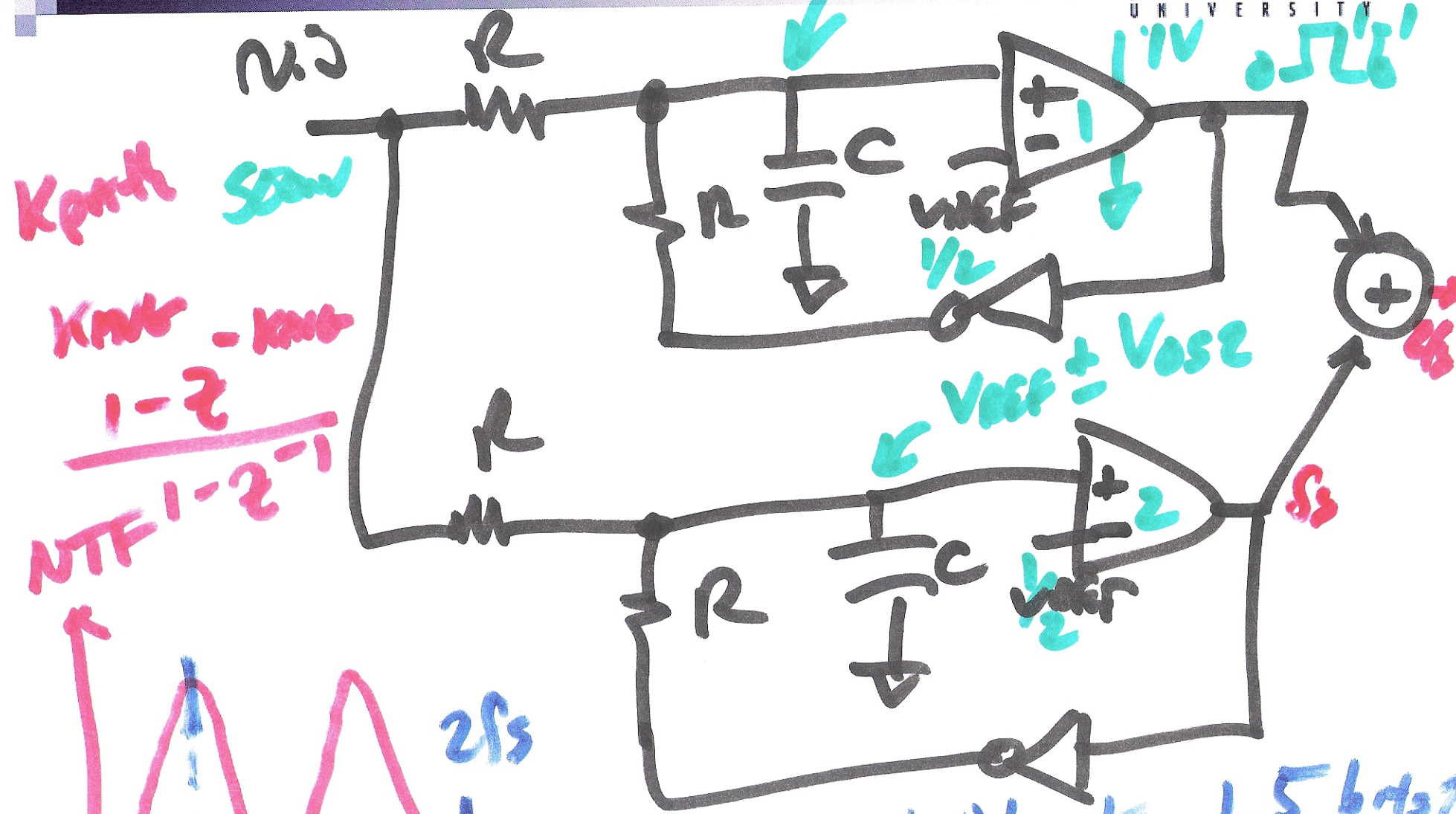
$$\frac{v_o}{v_i} = \frac{A}{1 + \beta A}$$

$$= \frac{1}{\frac{1}{A} + \beta} \approx \frac{1}{\beta}$$

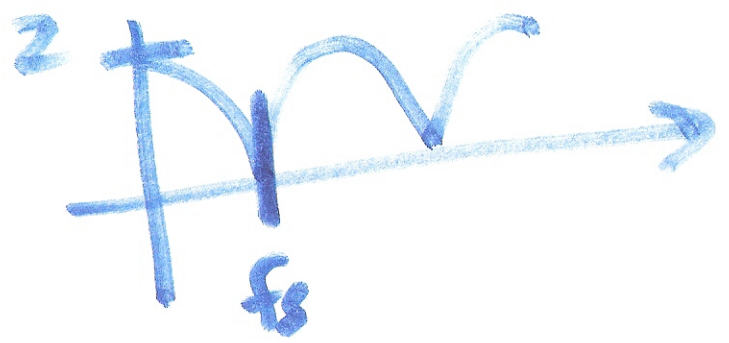
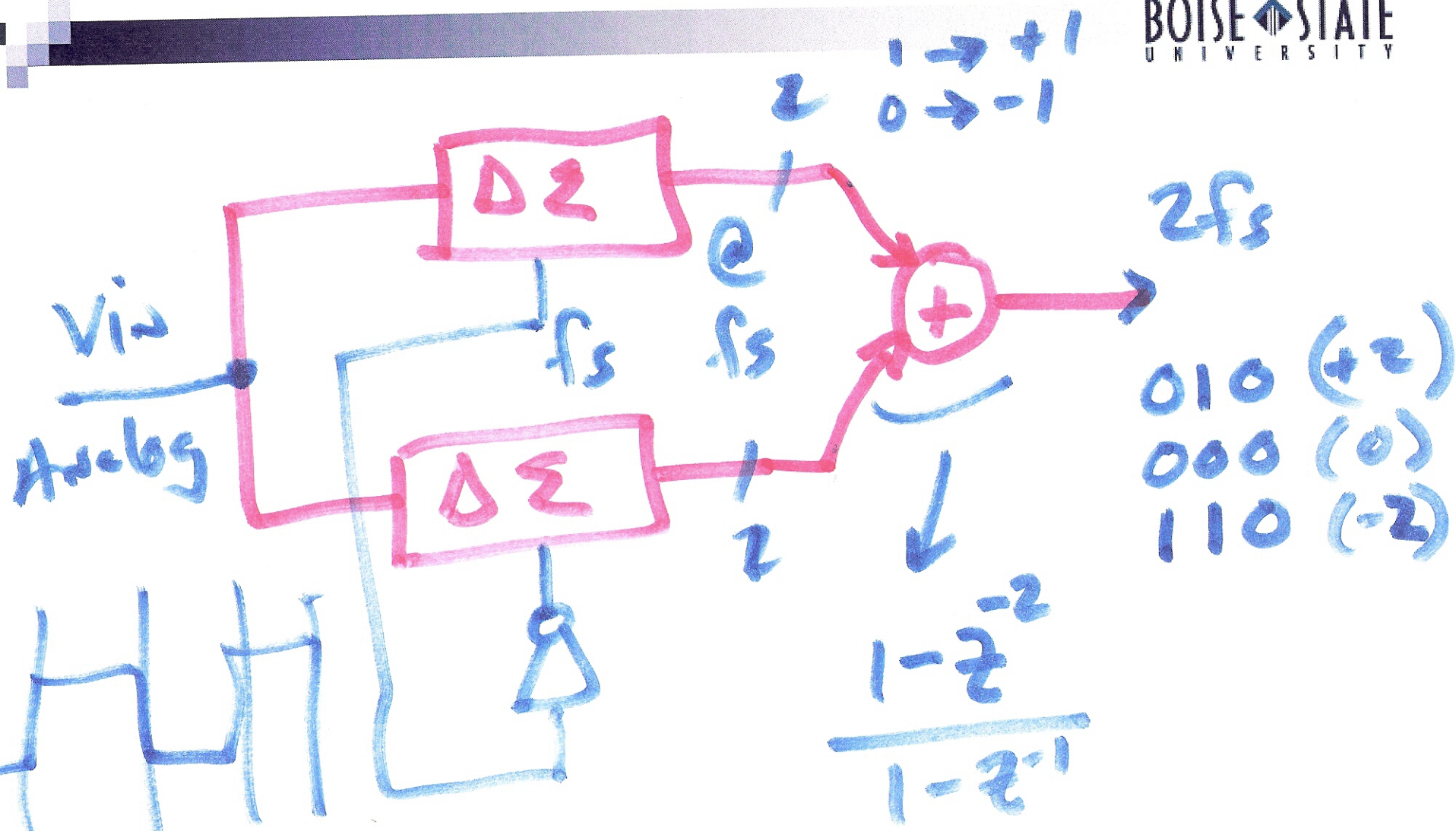
1-bit DAC



2)

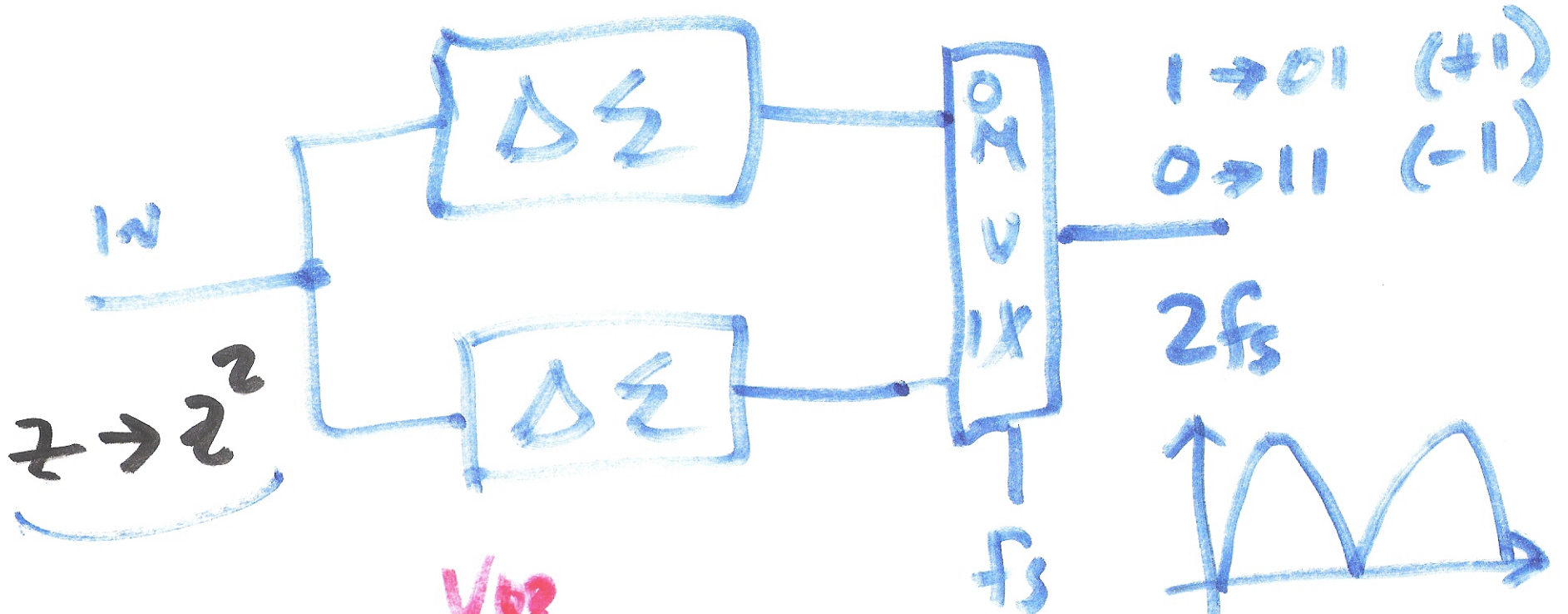


3)

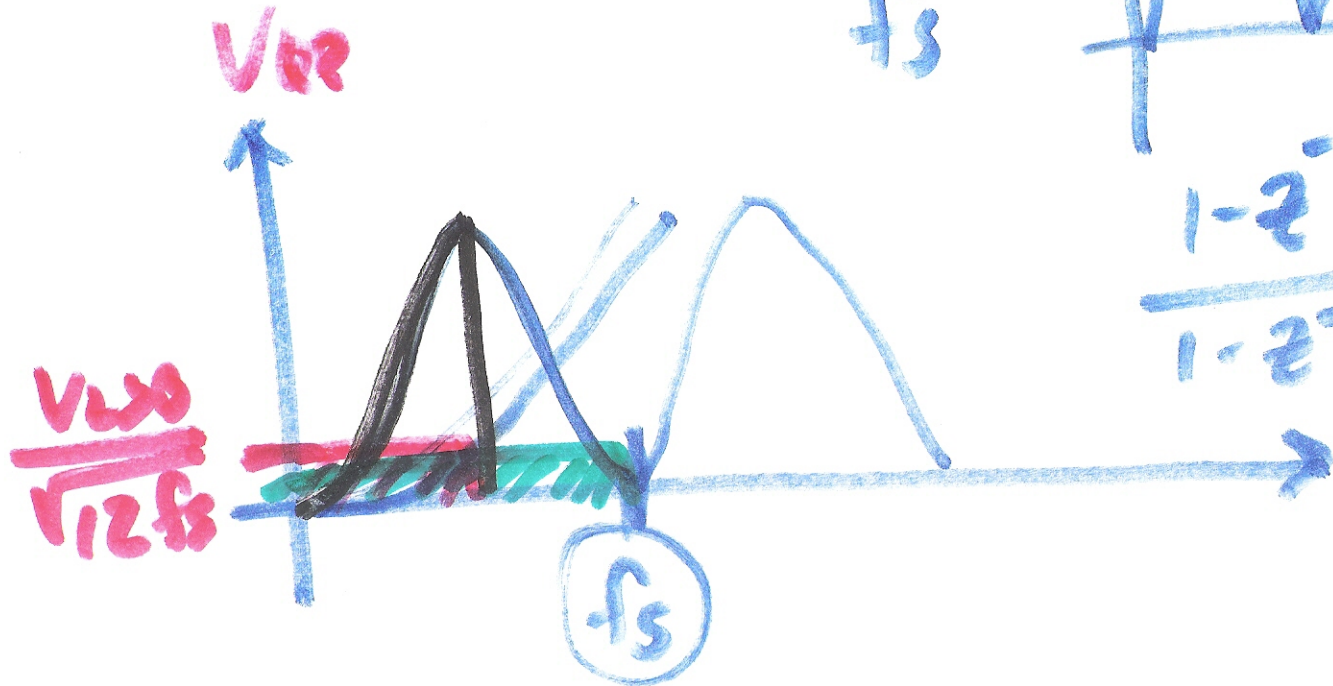


4)

HW



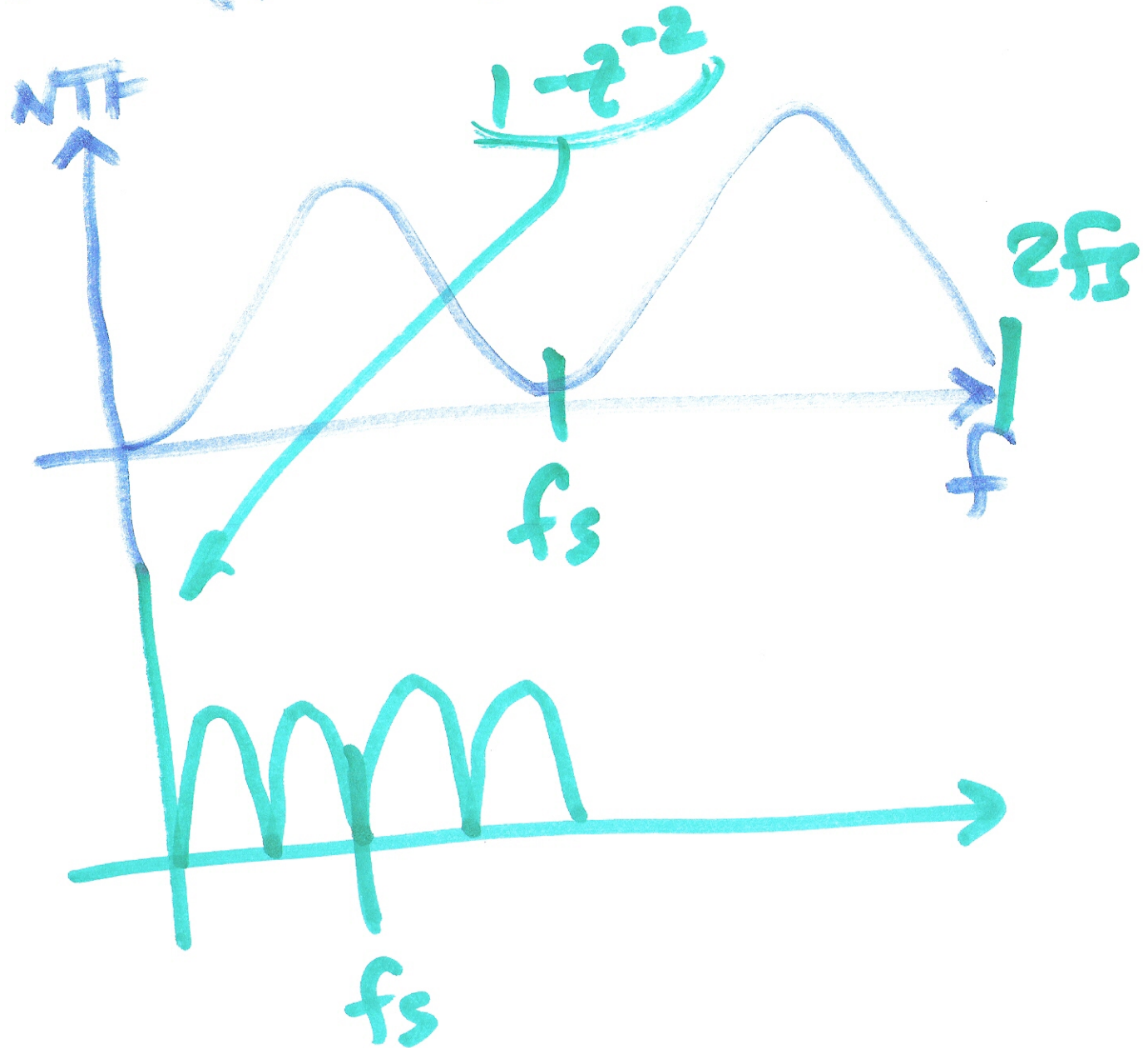
$z \rightarrow z^2$



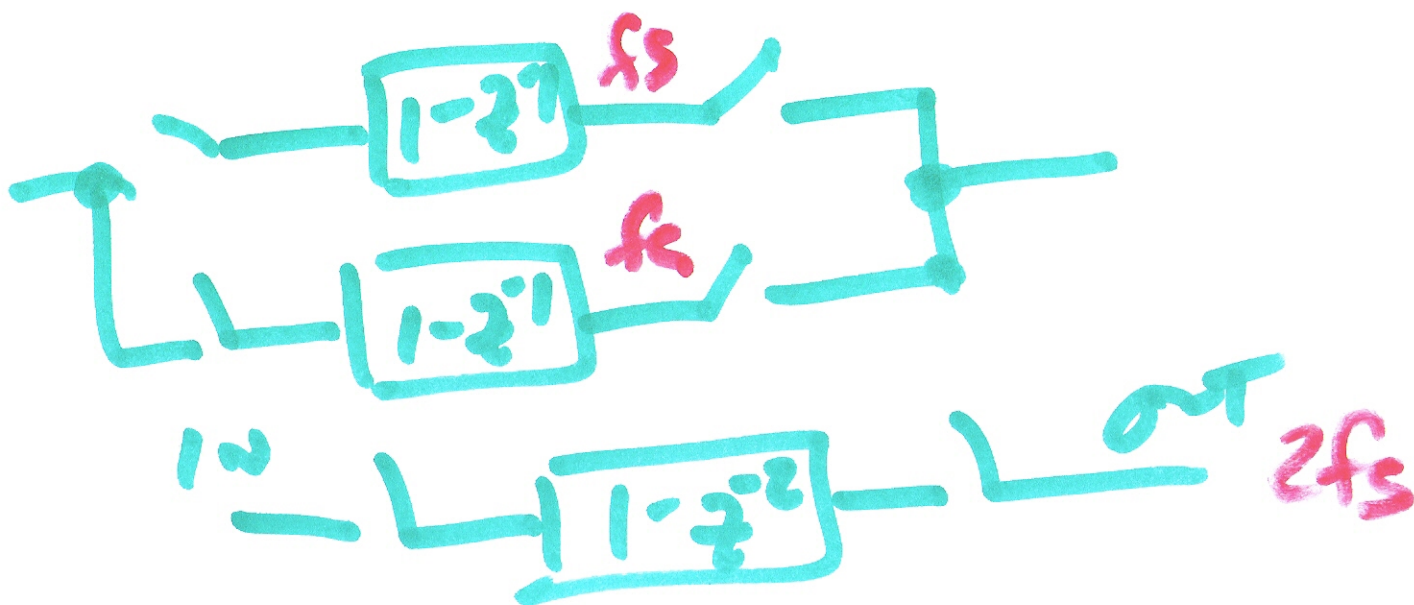
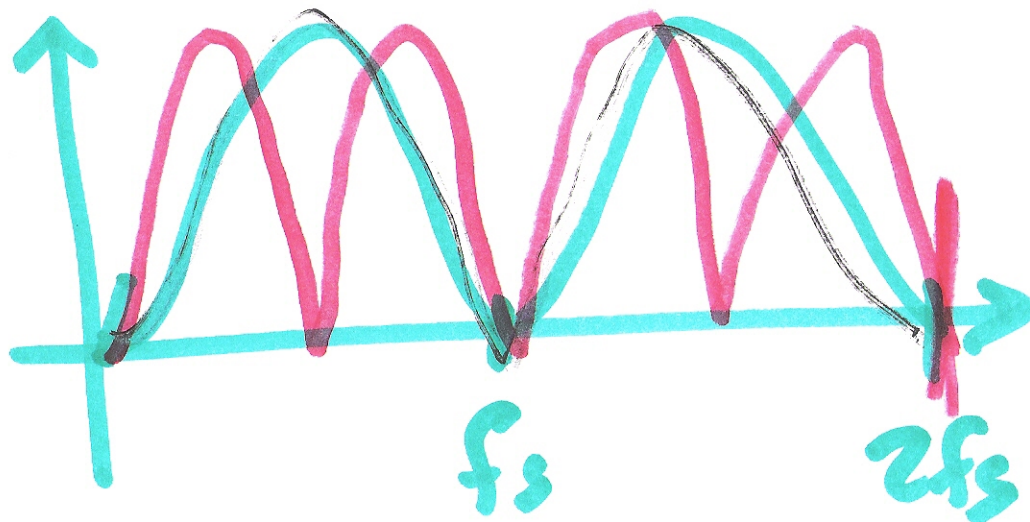
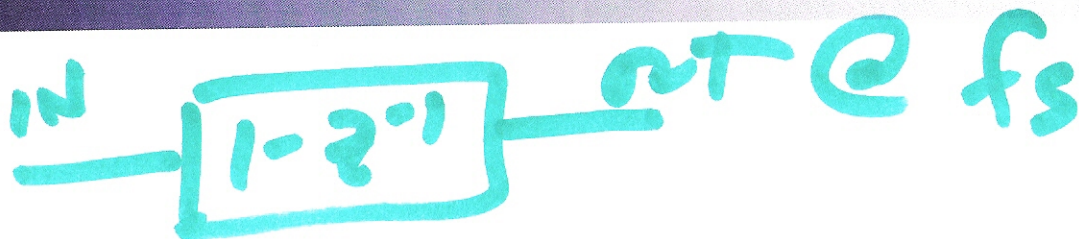
$\frac{1-z^{-2}}{1-z^{-1}} \rightarrow \frac{1-z^{-1}}{1-z^{-2}}$

5)

$$NTF = (1 - z^{-1}) \quad z \rightarrow z^2$$



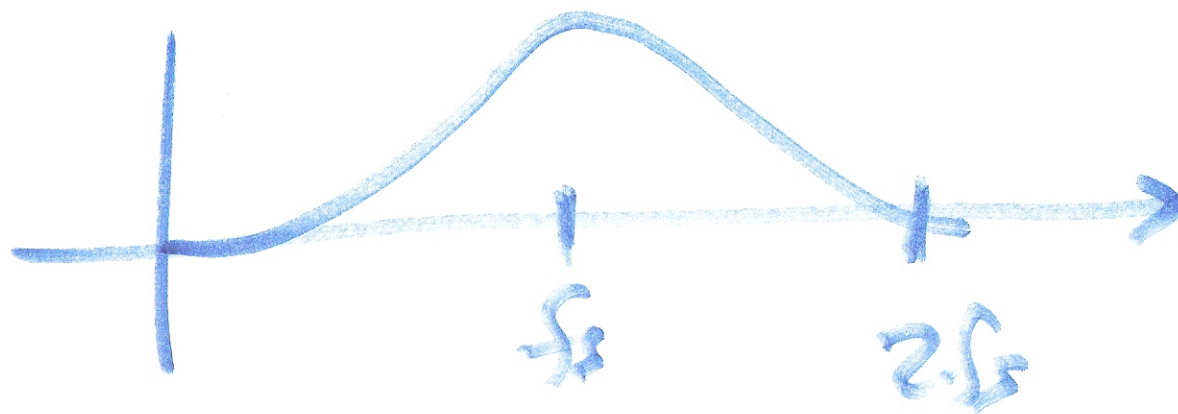
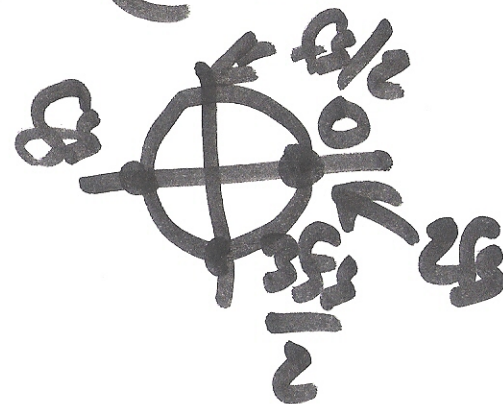
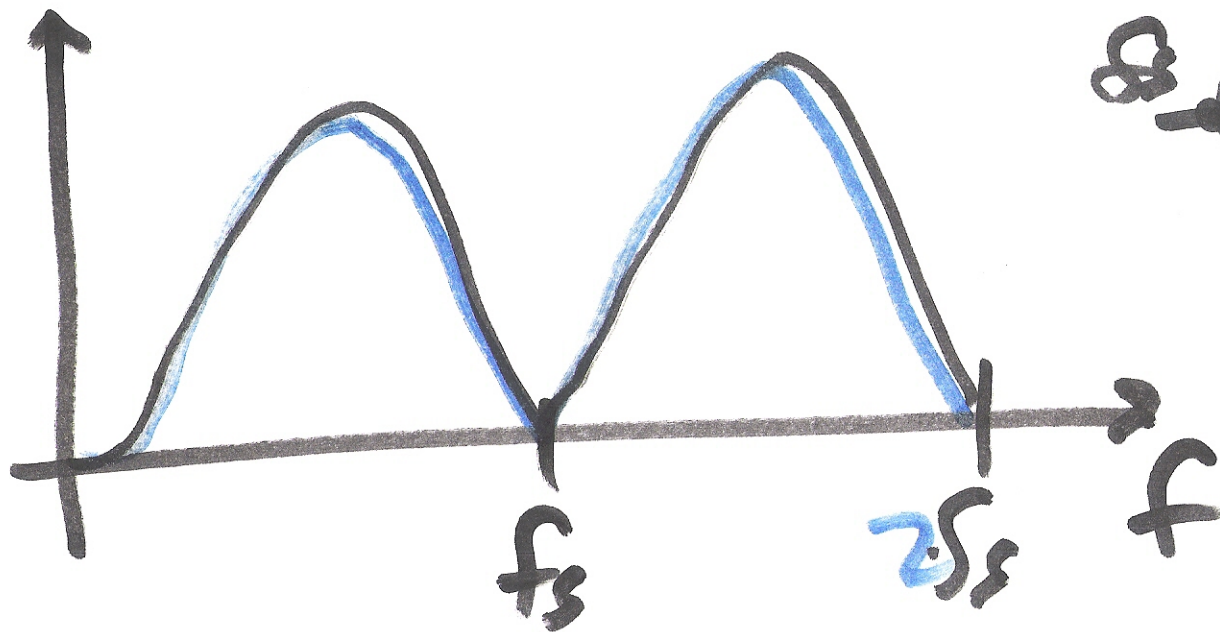
6)



7)

$1-z^{-1}$  @  $f_s$

$1-z^{-2}$  @  $2f_s$



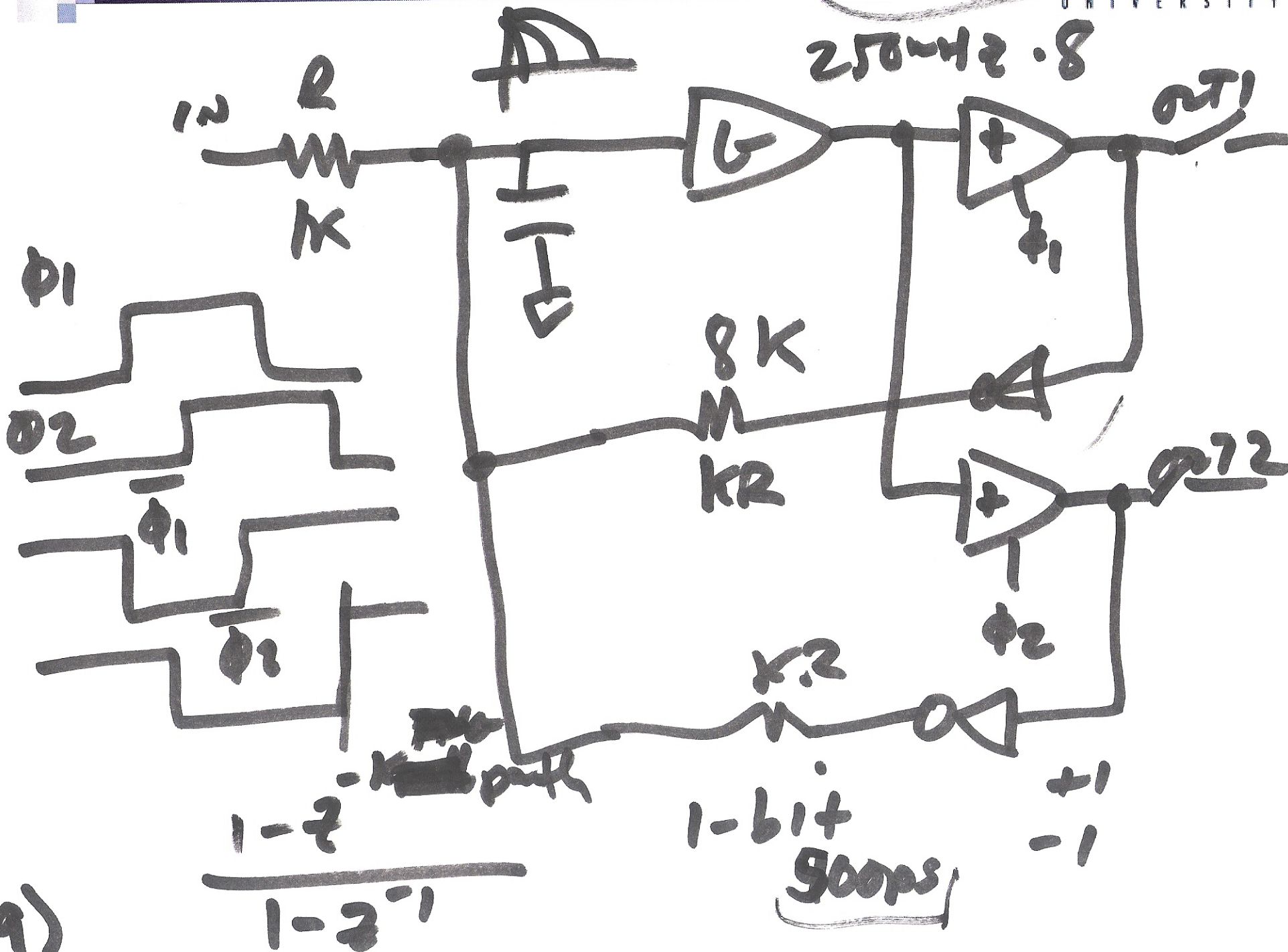
8)



KOIS

$f_s \cdot K_{path}$

$250 \text{ kHz} \cdot 8$



9)

$$\frac{1-z^{-2}}{1-z^{-1}}$$

1-bit  $\sigma$ -delta modulator