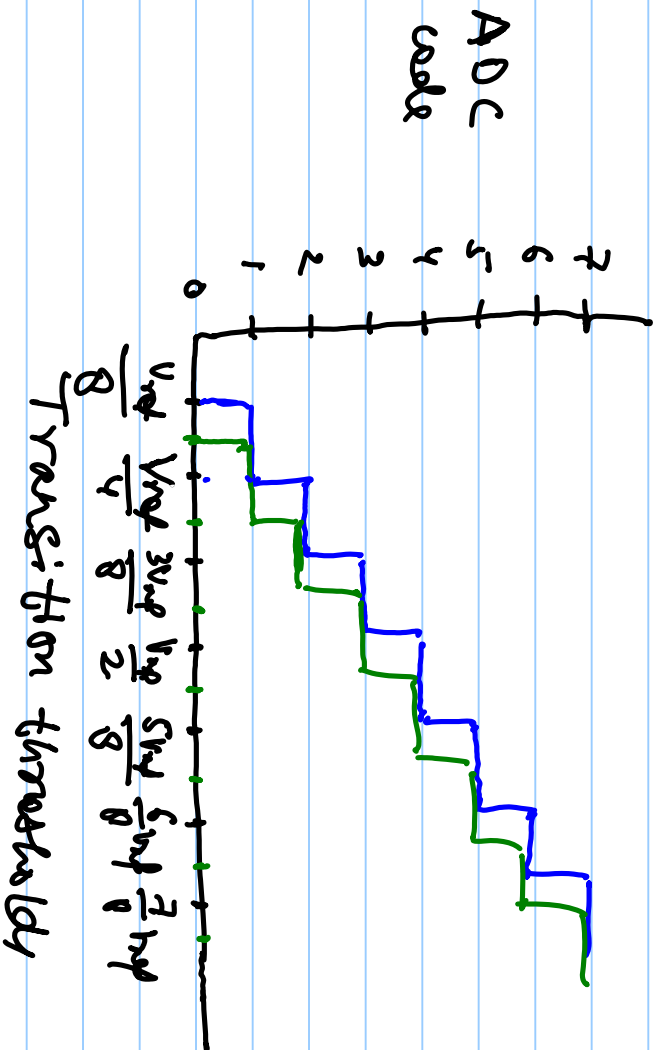
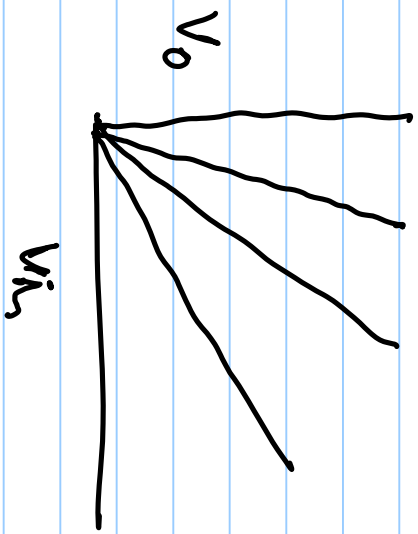


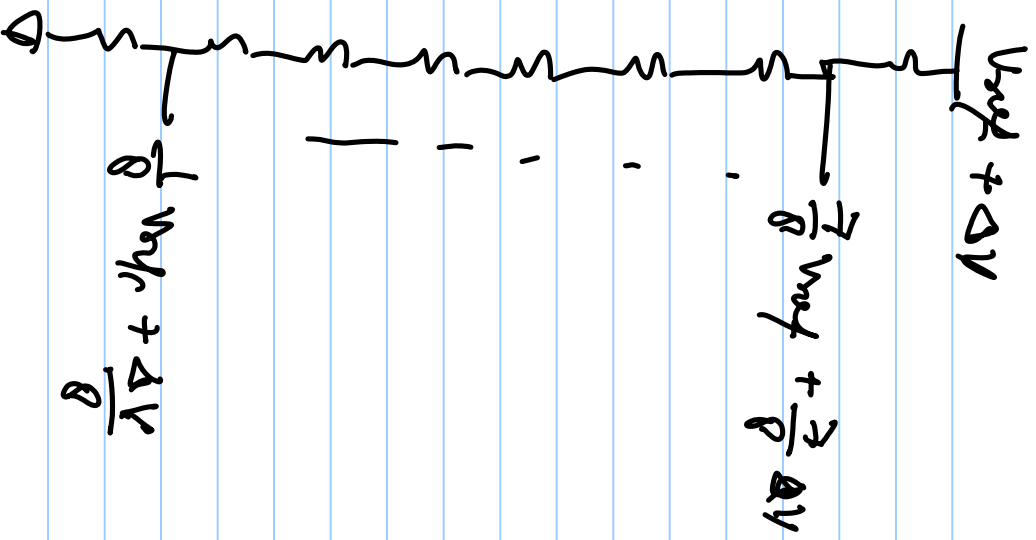
## Offset Error in A/D or D/A conversion



# Gain Error



$$Gain = \frac{dV_o}{dV_{in}}$$

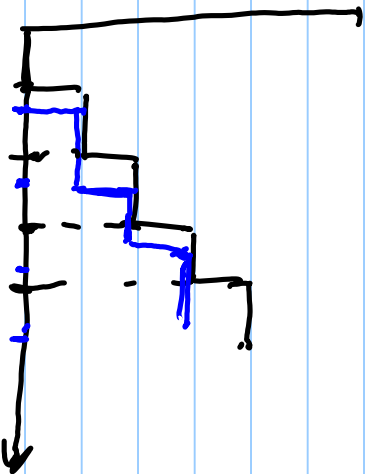


DNL (Differential Non-Linearity)

$$DNL = \frac{V_{\text{adc}}(k) - V_{\text{adc}}(k-1) - V_{\text{LSB}}}{V_{\text{LSB}}}$$

$$V_{\text{LSB}} = \frac{V_{\text{ref}}}{2^N}$$

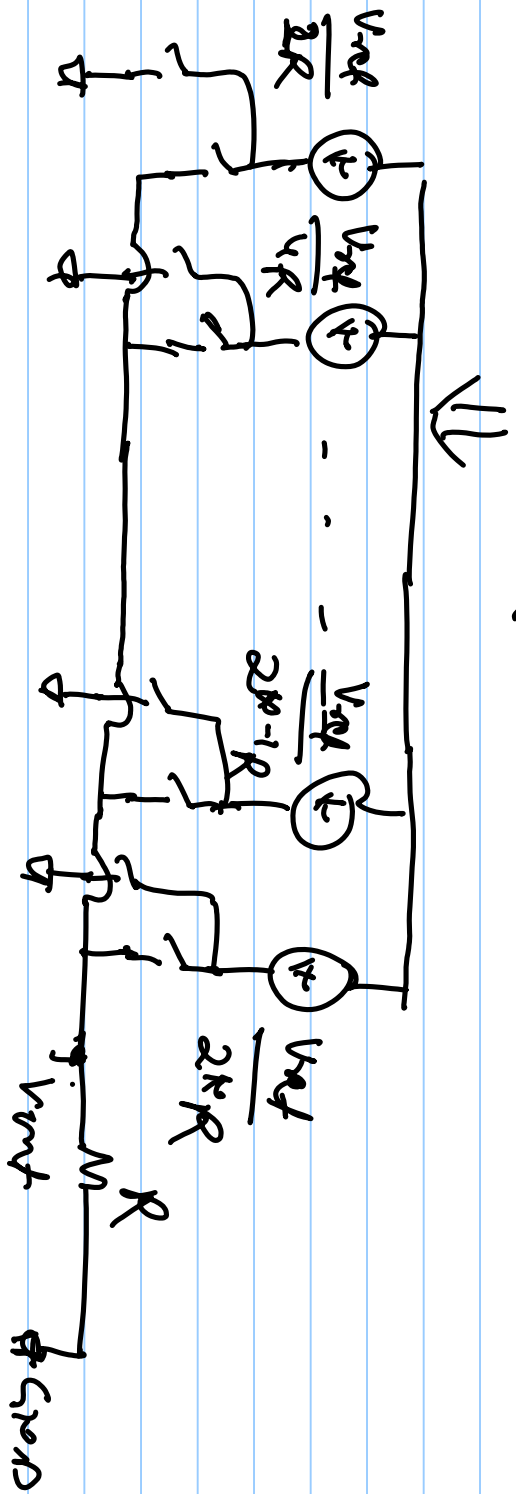
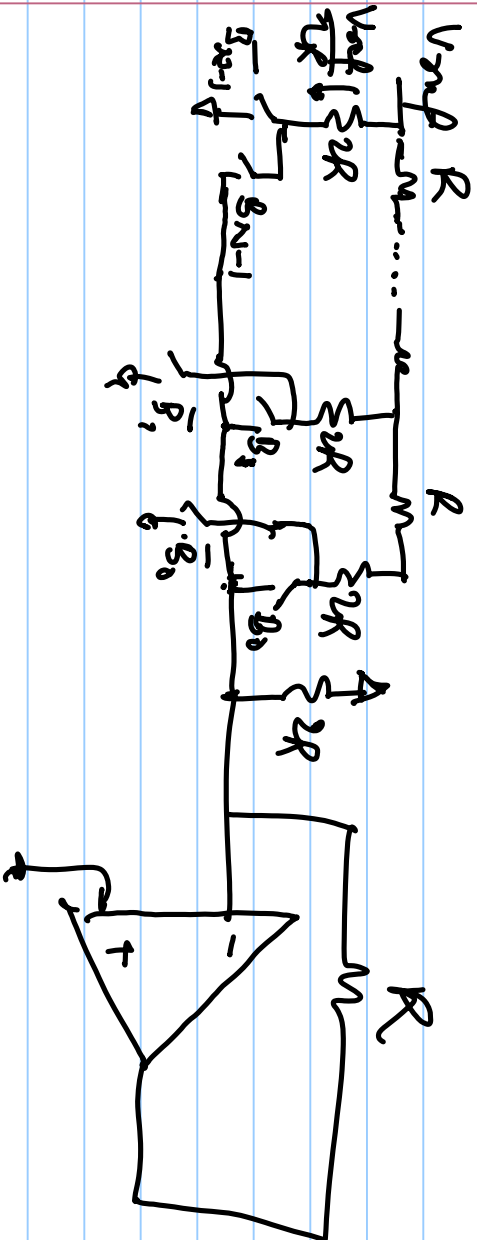
if  $DNL < 1 \text{ LSB}$  there will be no missing code.



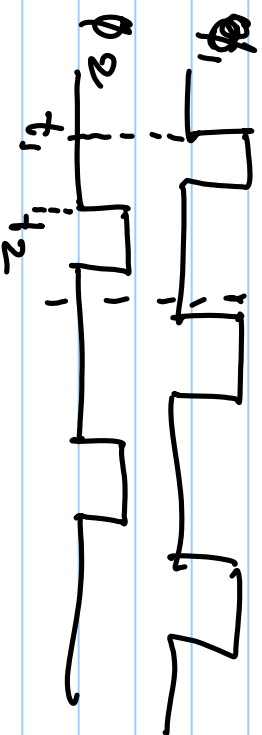
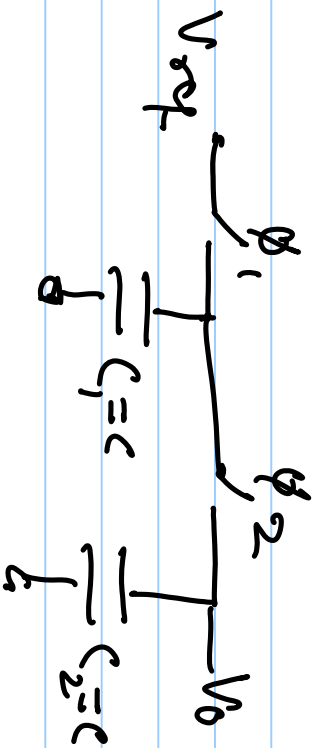


INL  $\rightarrow$  maximum devff from ideal curve.

DAC  $\rightarrow$  R2R dac.



## Capacitive D/A converter



Total charge stored on  $C_1$  in  $\phi_1$  after  $t_1$  & before  $t_2$

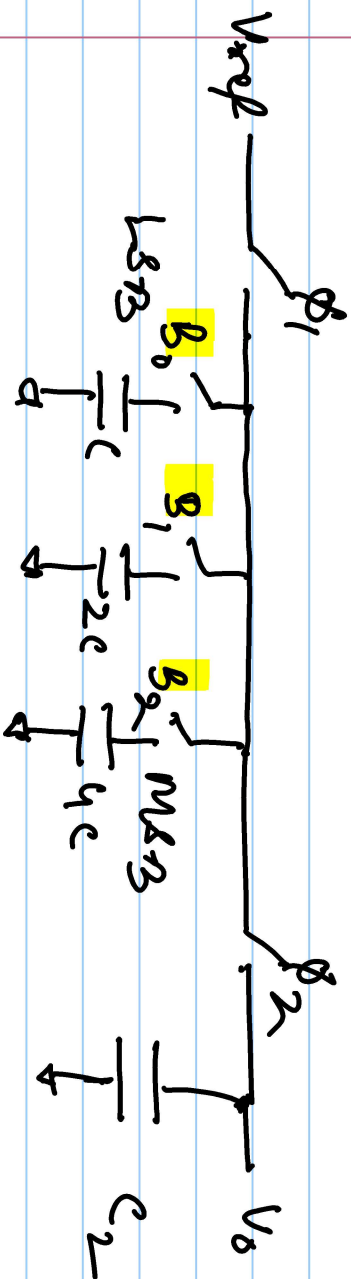
$$Q_1 = C_1 V_{ref.} = C V_{ref}$$

Total charge after  $t_2$  total charge remains same  
but total cap is different

$$Q_1 = Q_2 = V' (2C) = V_{ref} C$$

$$V' = \frac{V_{ref}}{2}$$

2-bit Capacitive D/A



$B_0$

1 0 0

$B_2, B_1, B_0$