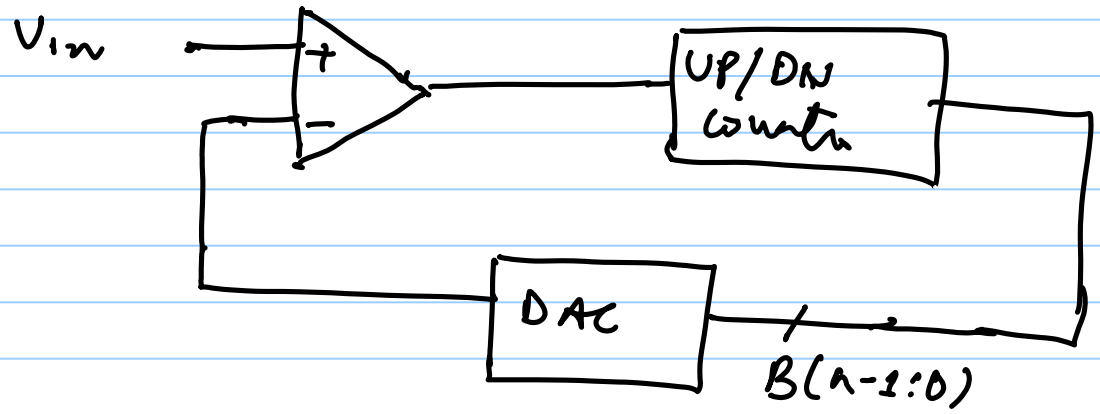
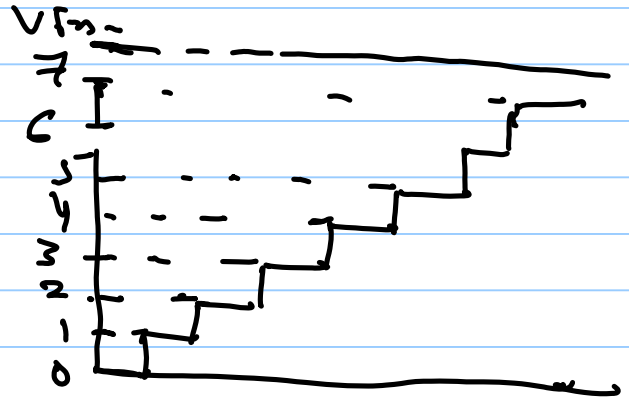
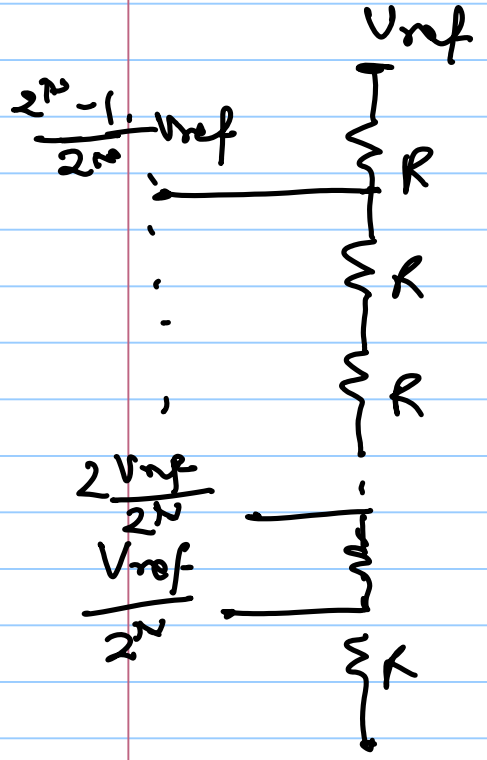
EE2019

Note Title 4/23/2019





D/A converters

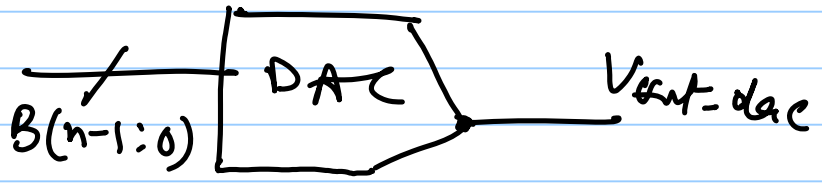


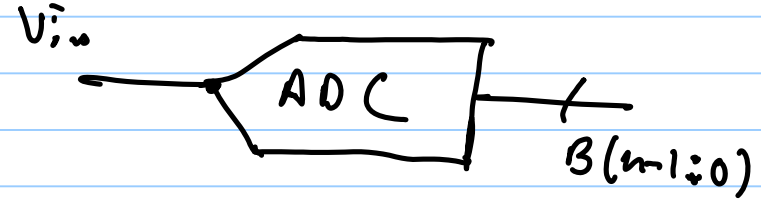
Linearly weighted D/A

2^N R are needed → quite large for higher no. of bits

Binary Weighted D/A Converter

Analog output-



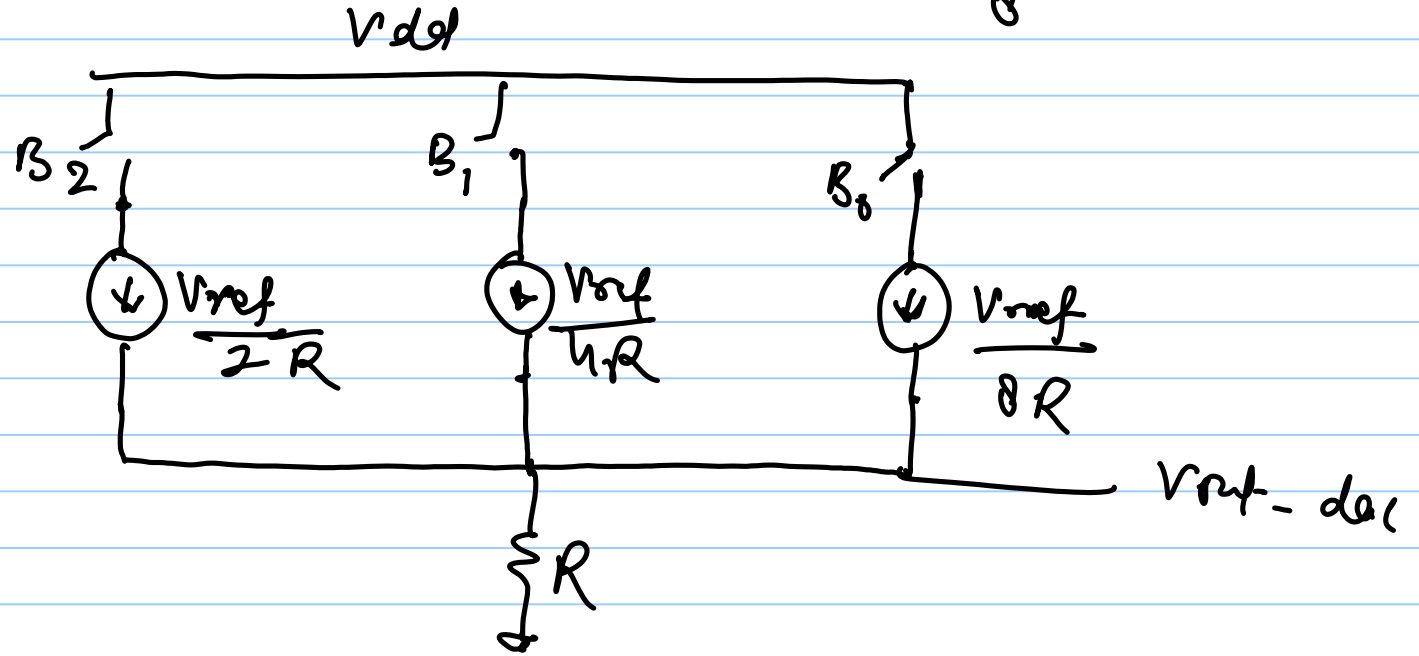


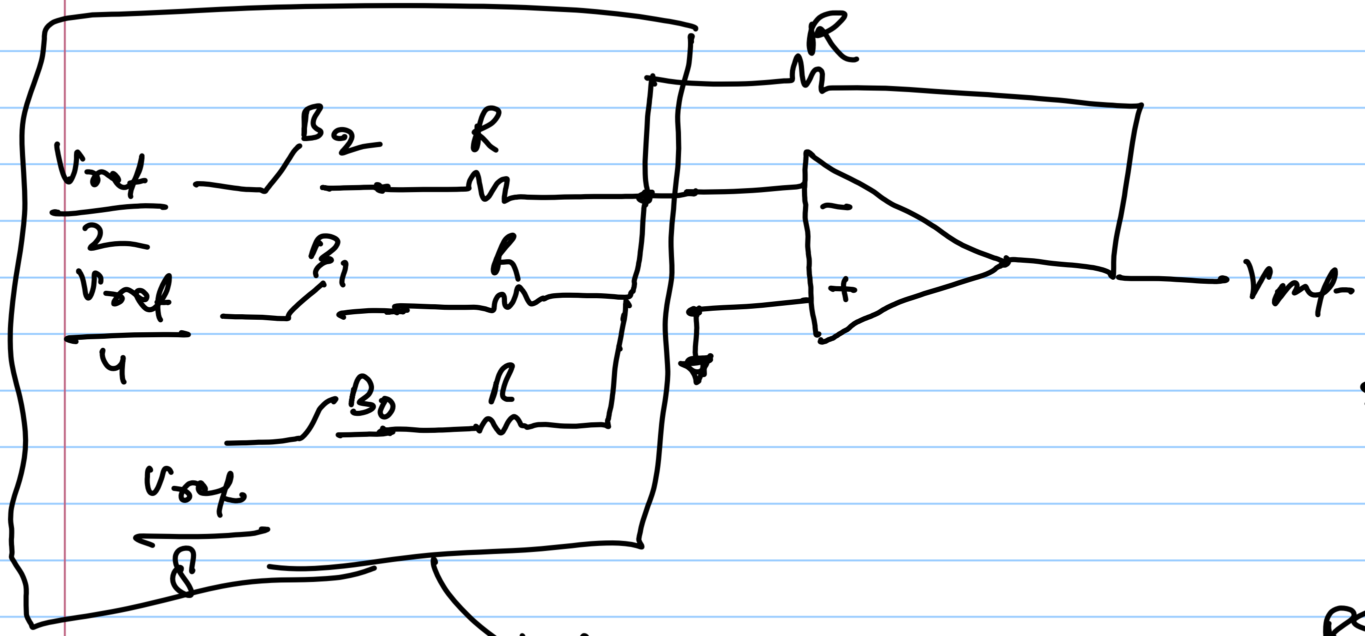
$$V_{out\text{-}dac} = \frac{V_{ref}}{2^n}\left[B_{n-1}2^{n-1} + \cdots + B_1 2^1 + B_0 2^0\right]$$

$$= \left[B_{n-1}\frac{V_{ref}}{2} + B_{n-2}\frac{V_{ref}}{4} + \cdots + B_1 \cdot \frac{V_{ref}}{2^{n-1}} + B_0 \cdot \frac{V_{ref}}{2^n}\right]$$

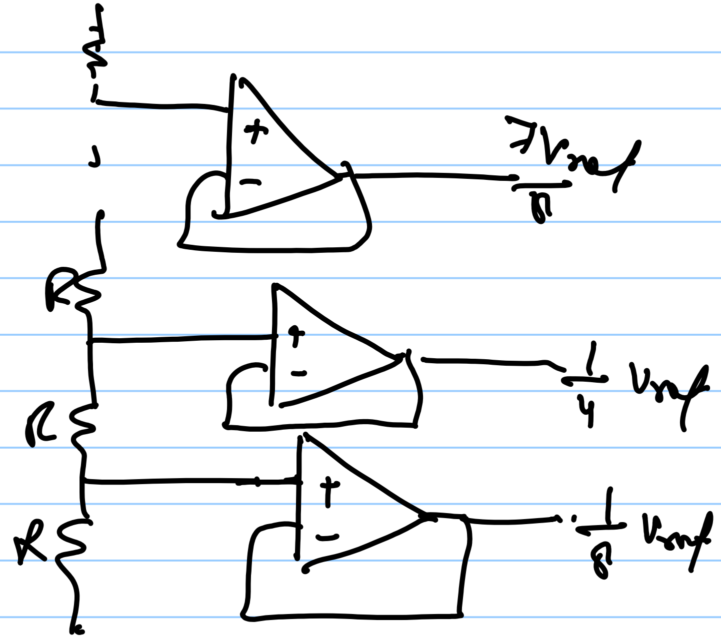
3-bit binary weighted D/A

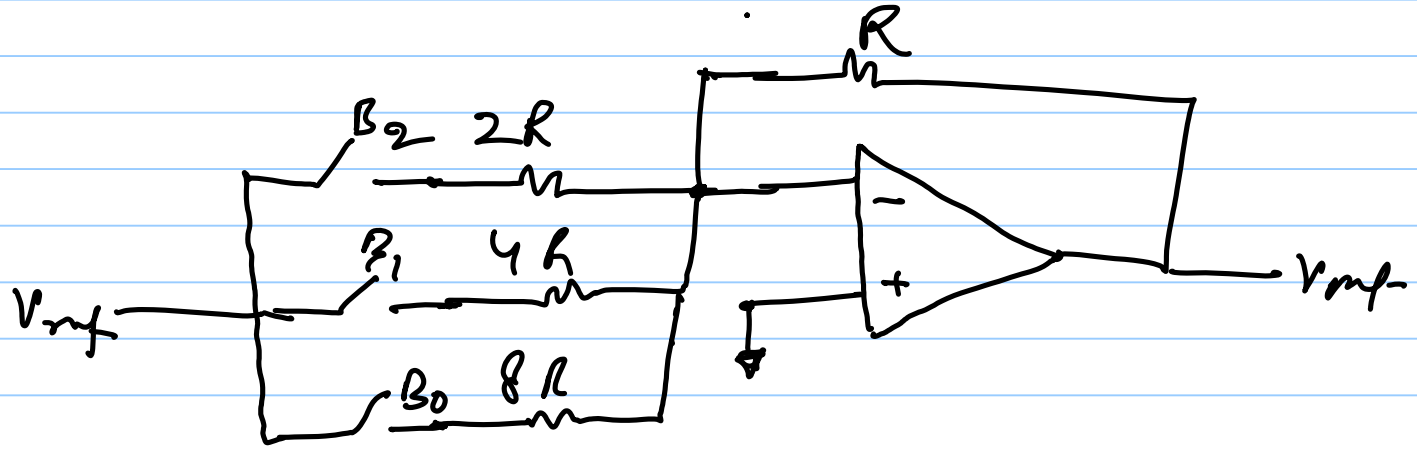
$LSB = \frac{V_{ref}}{8}$





V – I conversion





Errors in A/D and D/A converters

1. Quantization error
2. Error in LSB or transition steps
3. Offset → comparator offset or Vref offset

Max. Tolerable error to ensure Proper operation (no missing code)

$= \pm \frac{V_{LSB}}{2}$