

09/04/2019

Lecture 37

ADC

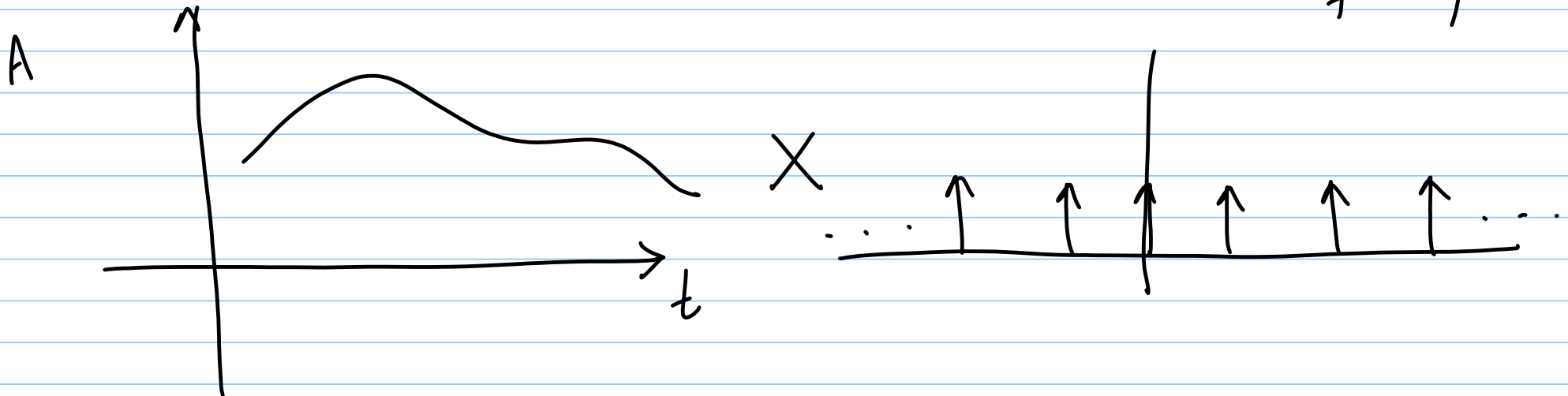
sampling

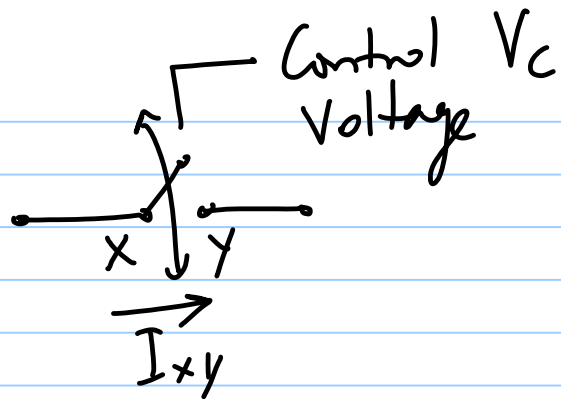
quantisation

Sampling

└ discretization in time domain

↓
discretization of amplitude



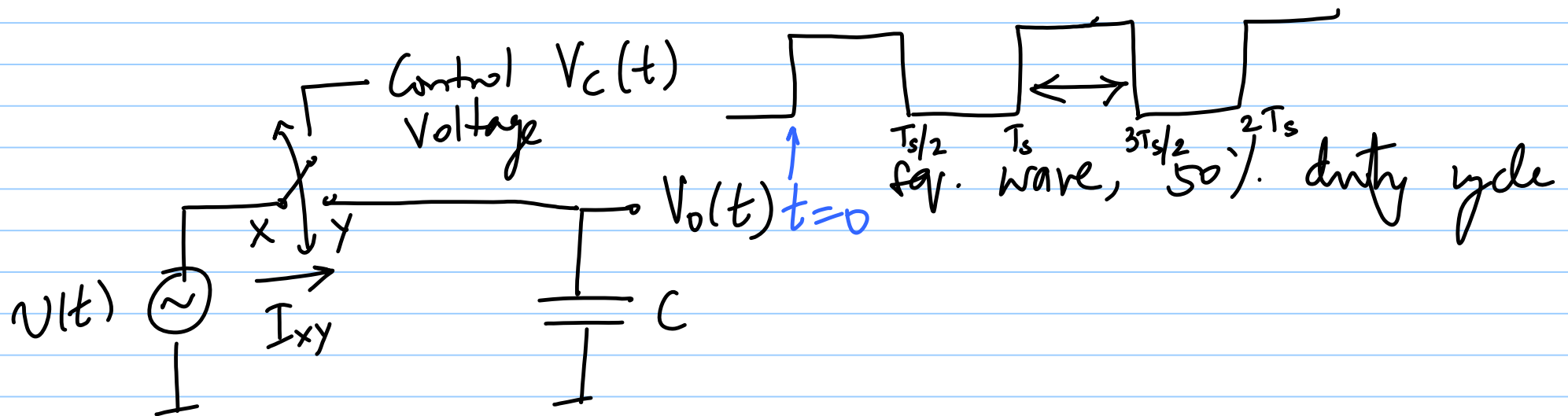


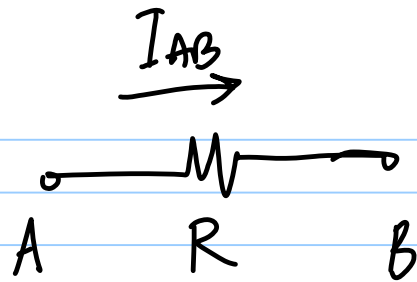
$$I_f \quad V_c = "1", \quad V_x = V_y$$

$$I_{xy} = \text{anything}$$

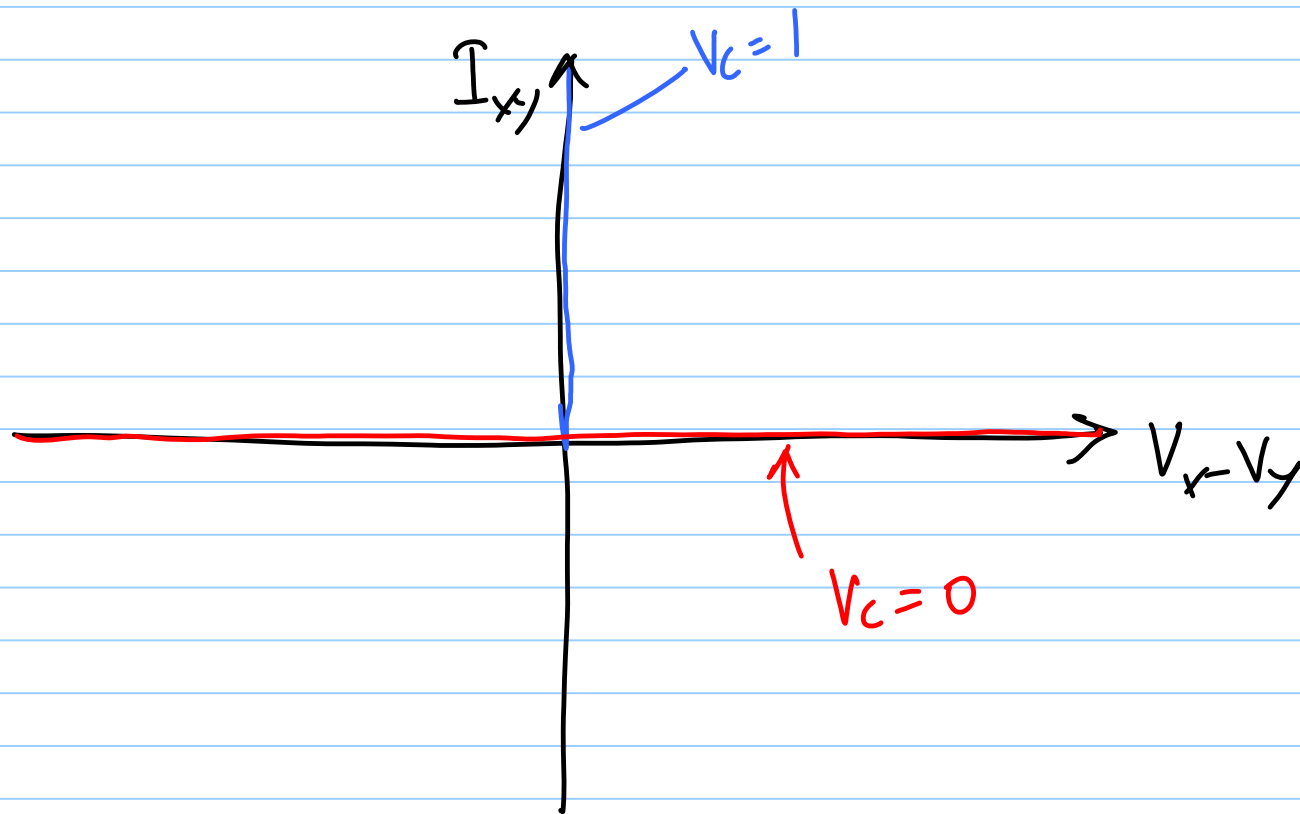
$$I_f \quad V_c = "0", \quad I_{xy} = 0$$

V_x & V_y are set by
the rest of the network

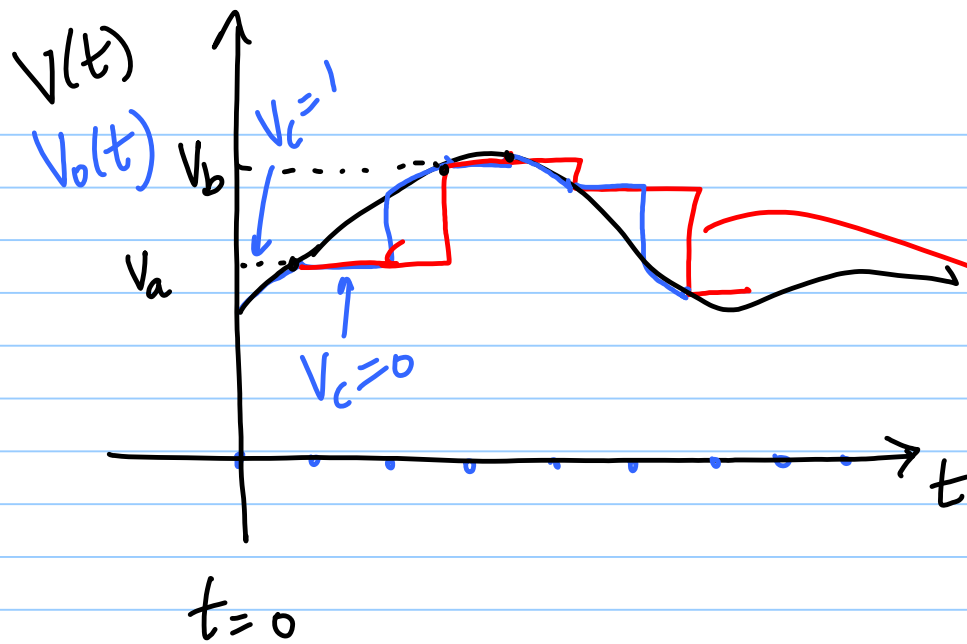




$$I_{AB} = \frac{V_A - V_B}{R}$$

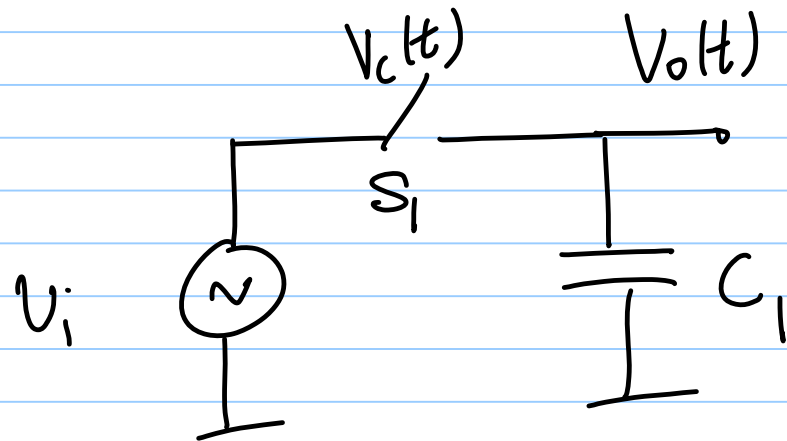


Switch

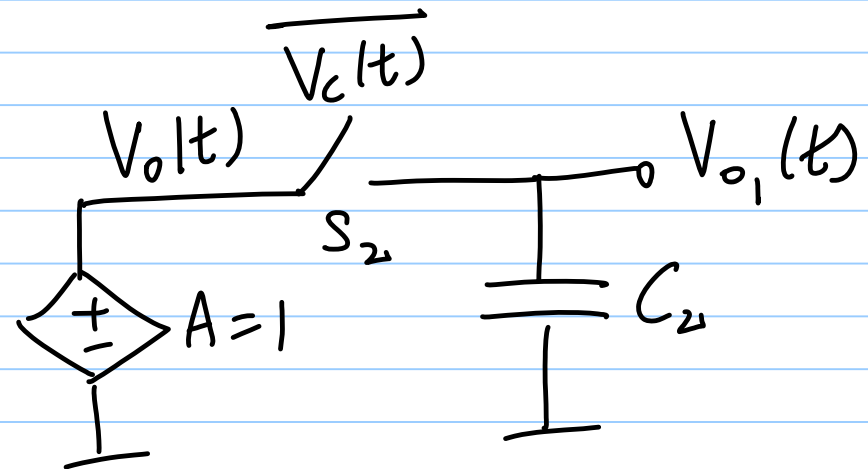


Track and Hold Circuit

Sample & Hold

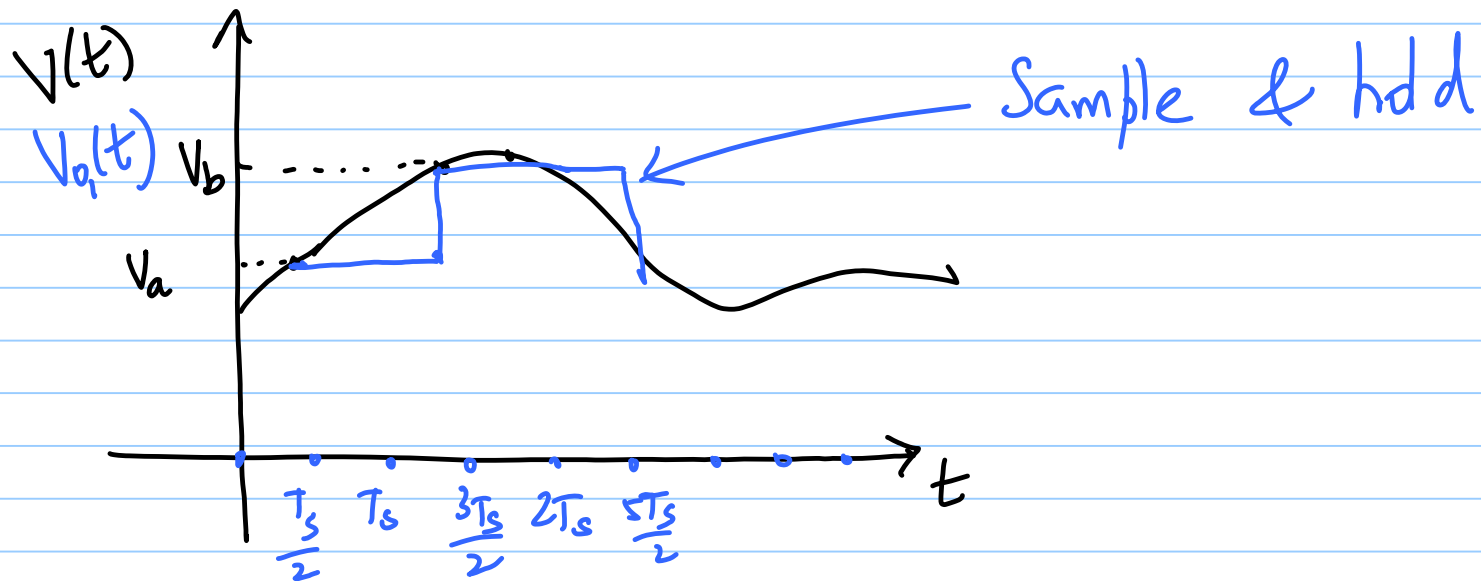


$$V_o(T_s/2) = V_a$$

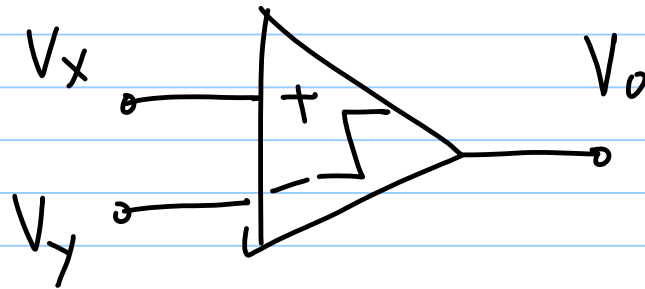


$$V_{o1}(T_s/2 + \Delta) = V_a$$

$$V_o(3T_s/2) = V_b \quad ; \quad V_{o,1}(3T_s/2 + \Delta) = V_b$$

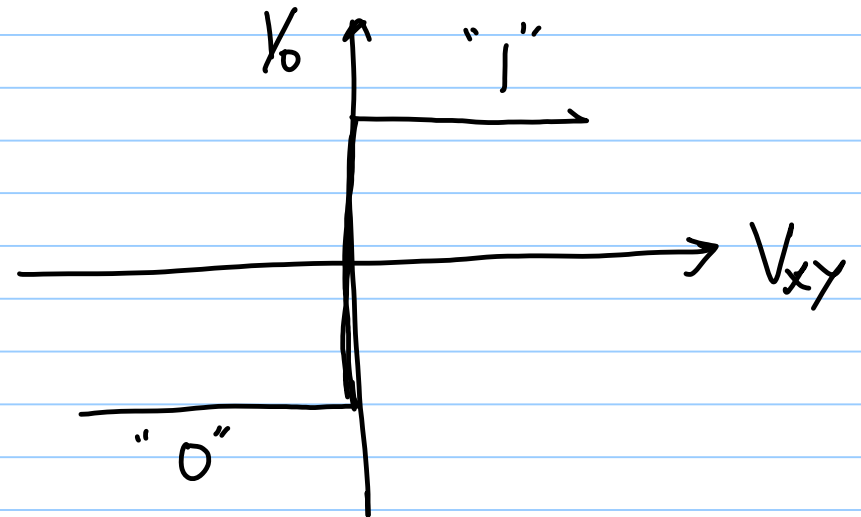


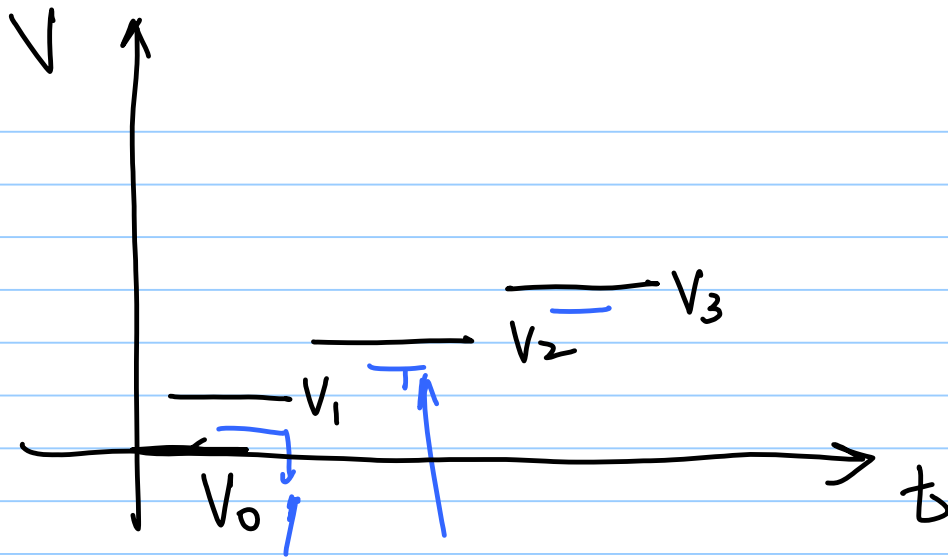
Quantisation



$$\text{If } V_{xy} > 0, V_o = 1$$

$$V_{xy} < 0, V_o = 0$$

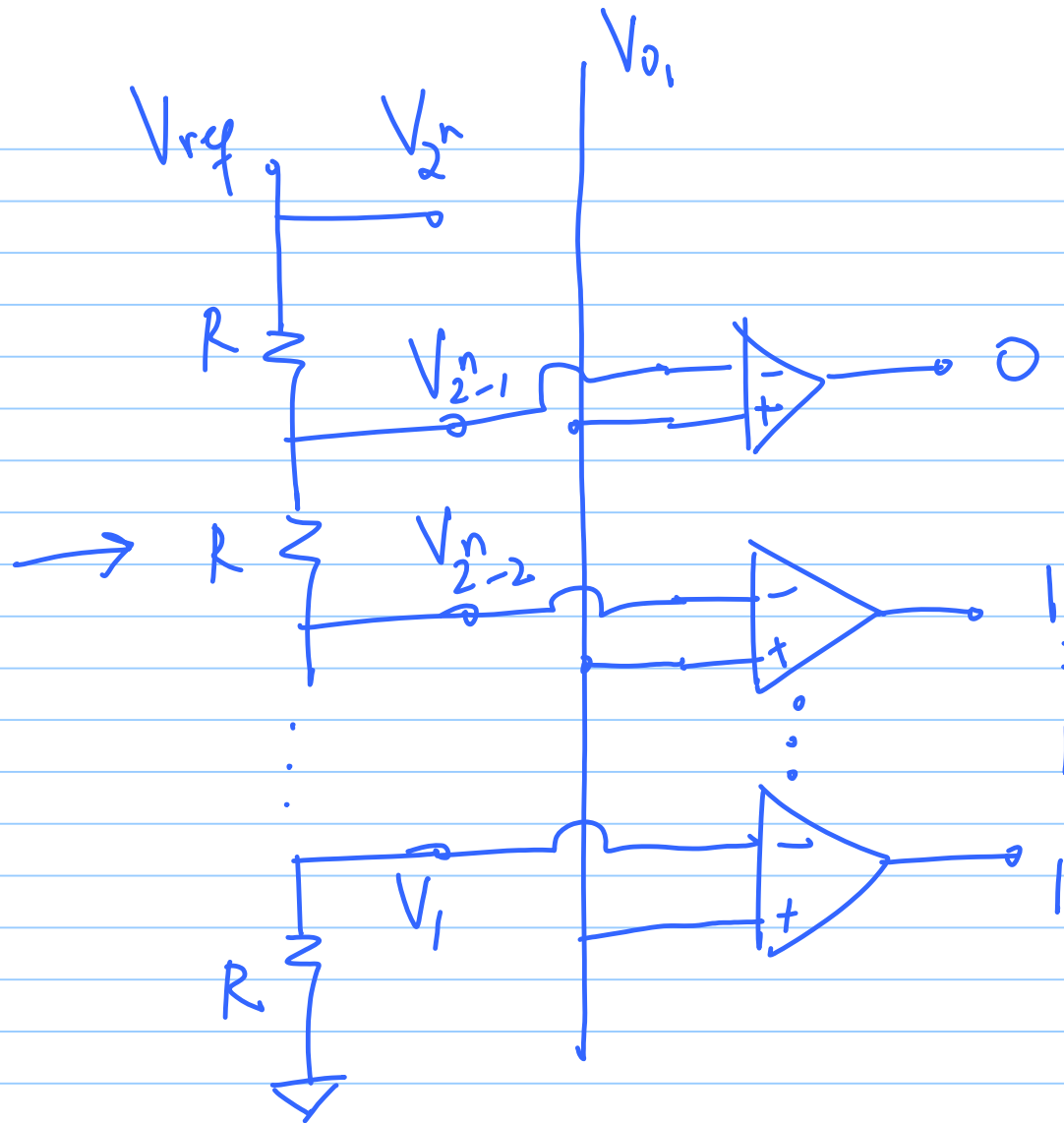




for n -bit quantizer : 2^n values

$2^n - 1$ thresholds

$2^n - 1$ comparators



0
0
0
:
:
:
0
1
:
1
:
1
:
1

Thermometer
Code