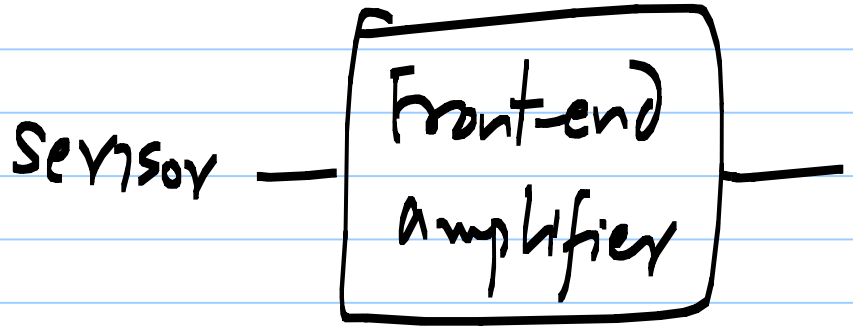
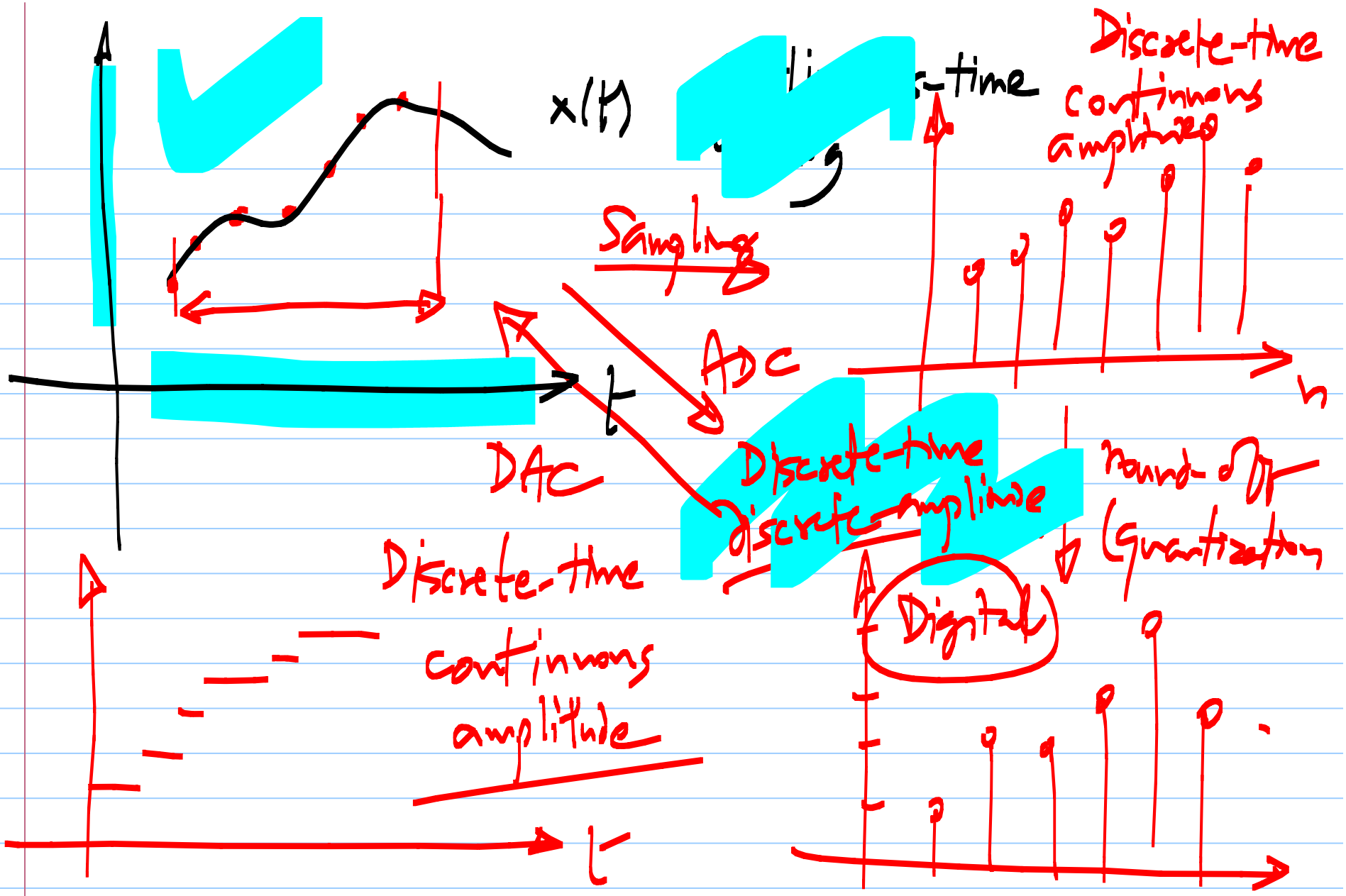
EE 2019

26/3/2018

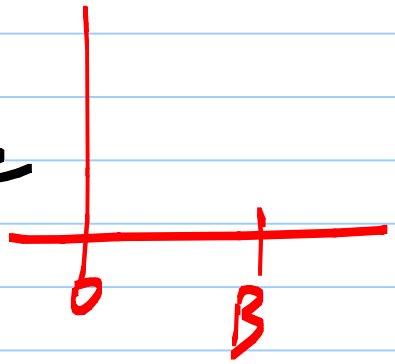
* Amplifier — Instrumentation amplifier
* DC-DC converters



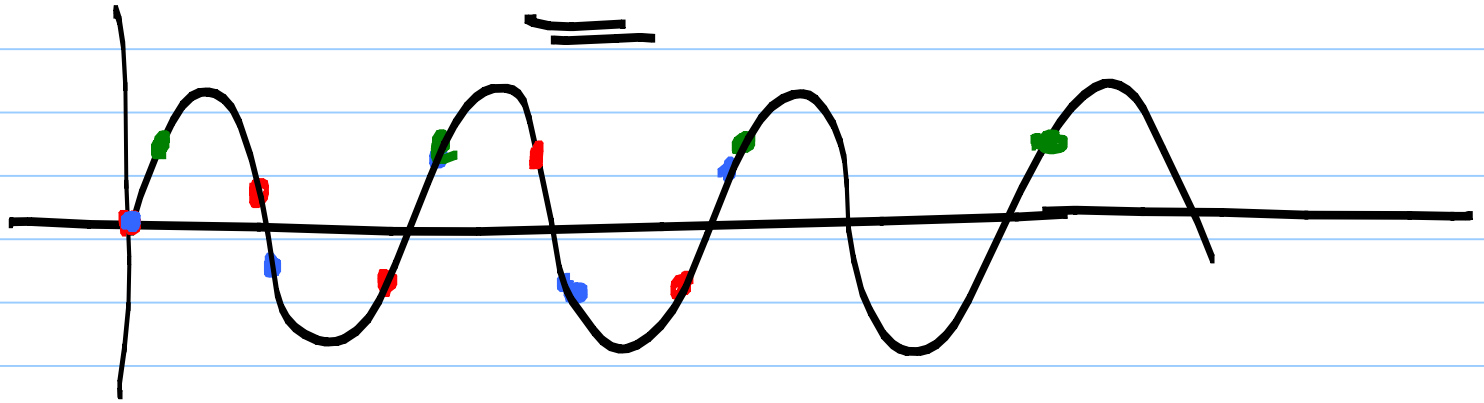

x(t)
Sampling
ADC
DAC
Discrete-time
continuous
amplitude
Discrete-time
discrete-amplitude
Digital
Round-off
Quantization

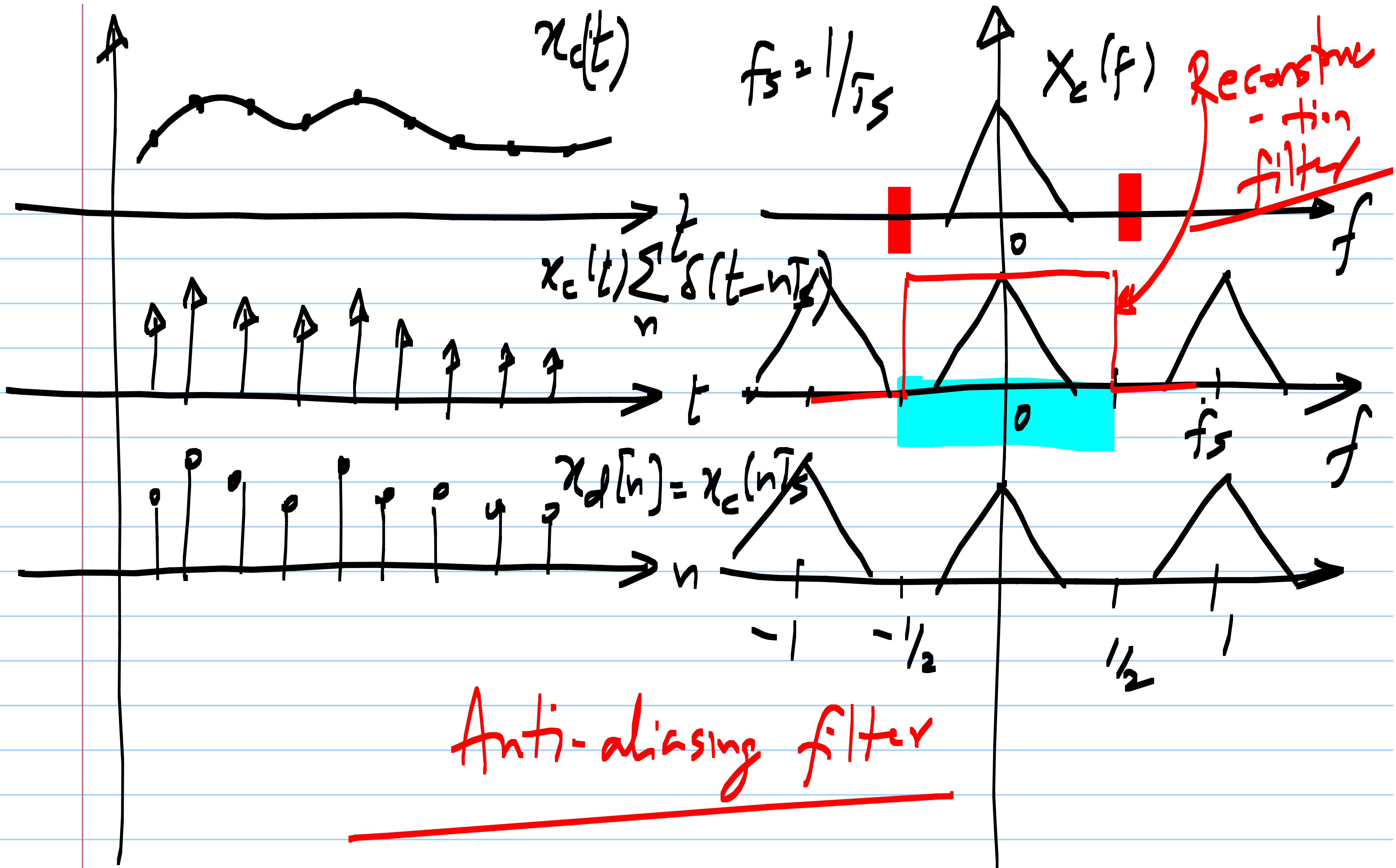
Sampling theorem: A continuous-time signal of bandwidth B can be reconstructed perfectly from its samples at a rate $2B$.

$2B$: Nyquist rate

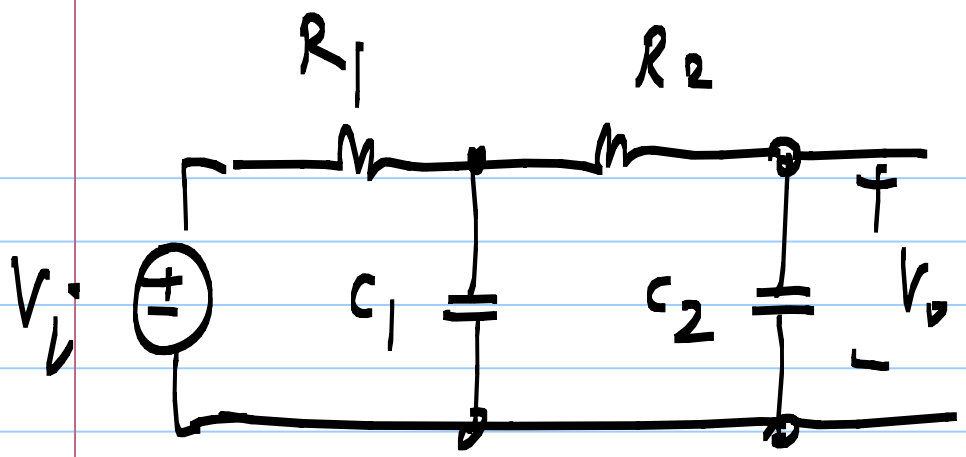


Sampling @ f_s $\longrightarrow$ $< f_s/2$

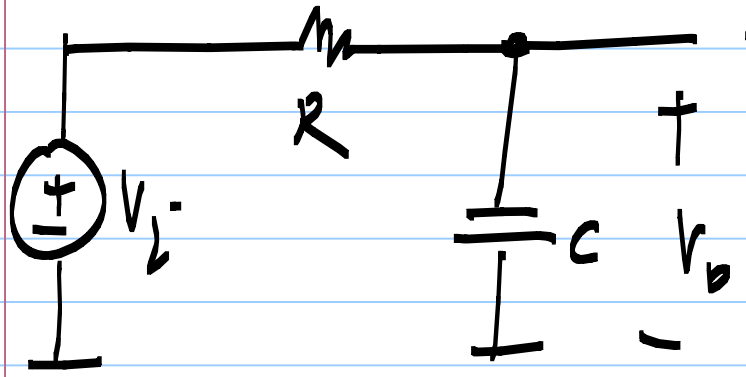




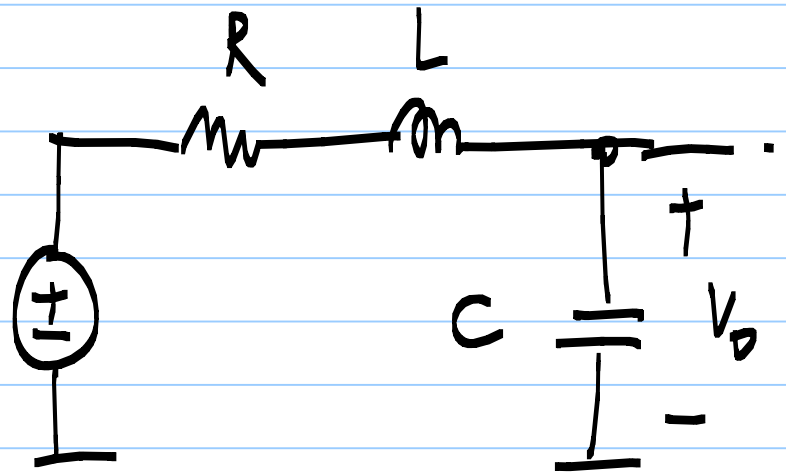
$x_c(t)$
$f_s = 1/T_s$
$X_c(f)$
Reconstruc-tion filter
$x_c(t)\sum_n \delta(t-nT_s)$
$x_d[n] = x_c(nT_s)$
-1
$-1/2$
$1/2$
1
f_s
Anti-aliasing filter


R1
R2
Vi
C1
C2
Vo

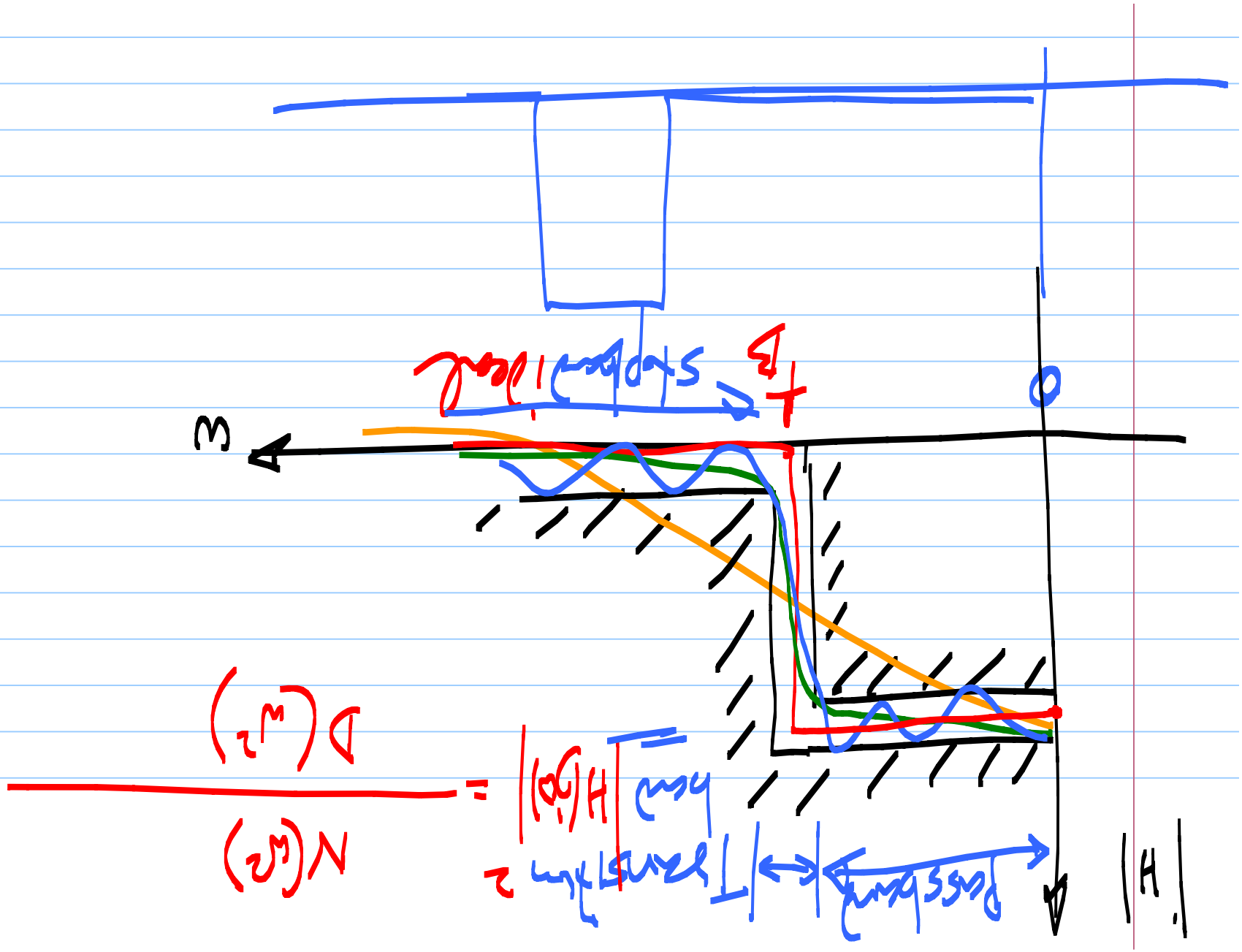
Low-pass filters:

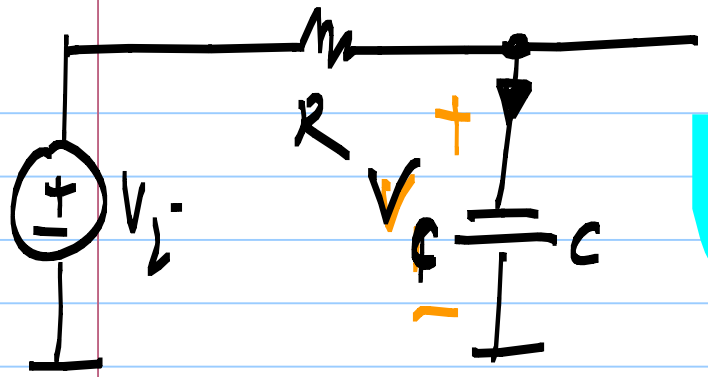


$$\frac{V_o}{V_i} = \frac{1}{1 + sCR}$$



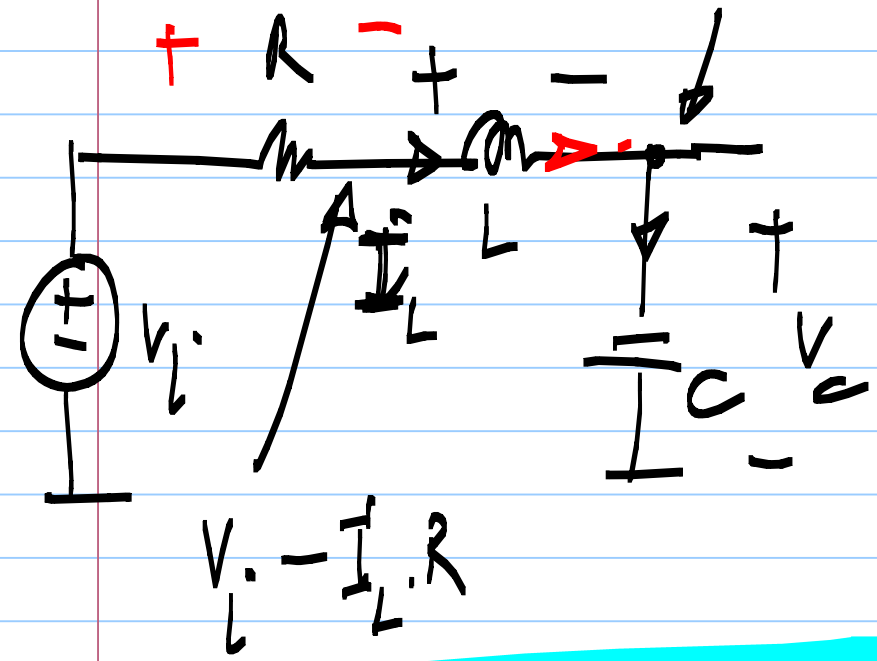
$$\frac{V_o}{V_i} = \frac{1}{s^2LC + sCR + 1}$$


E
0
|H|



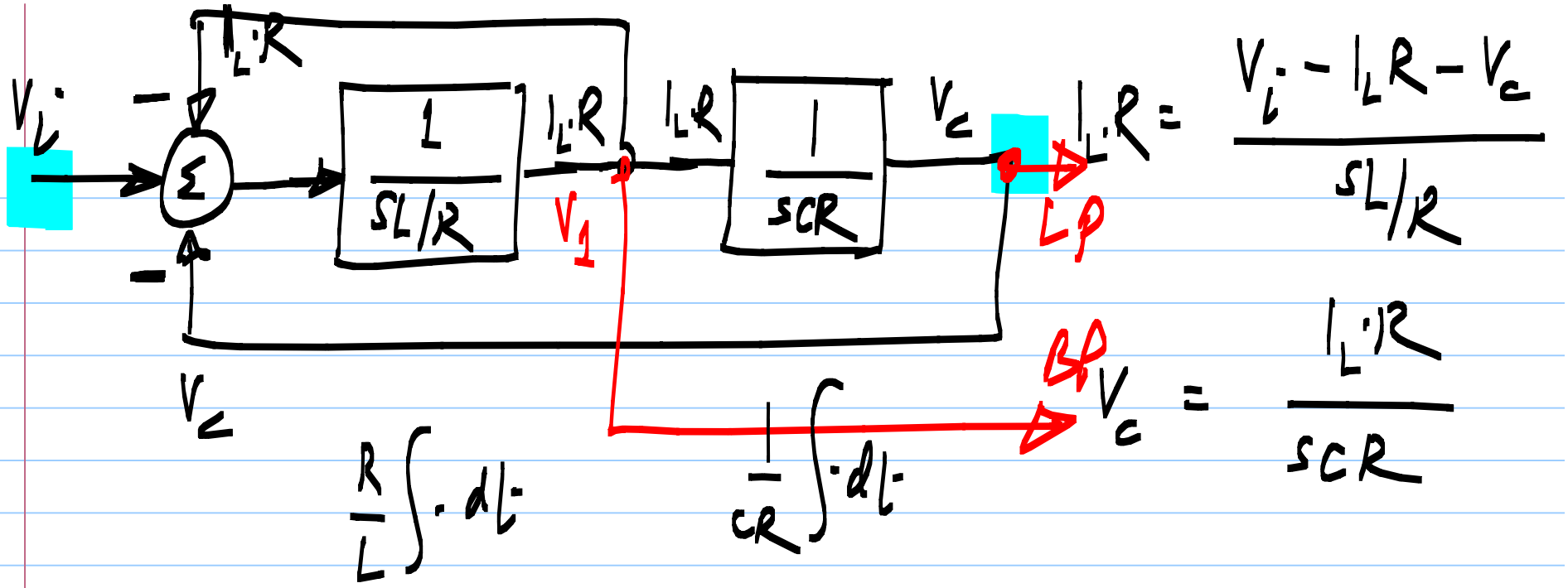
$$V_c = \frac{I_c}{sC} = \frac{V_i - V_c}{sCR}$$

$$V_c = \frac{V_i - V_c}{sCR}$$



$$R_L = \frac{\quad - \quad - \quad}{sL/R}$$

$$= \frac{\quad}{sCR}$$



$$\frac{V_c}{V_i} = \frac{1}{s^2LC + SCR + 1} \quad ; \quad \frac{V_1}{V_i} = \frac{SCR}{s^2LC + SCR + 1}$$