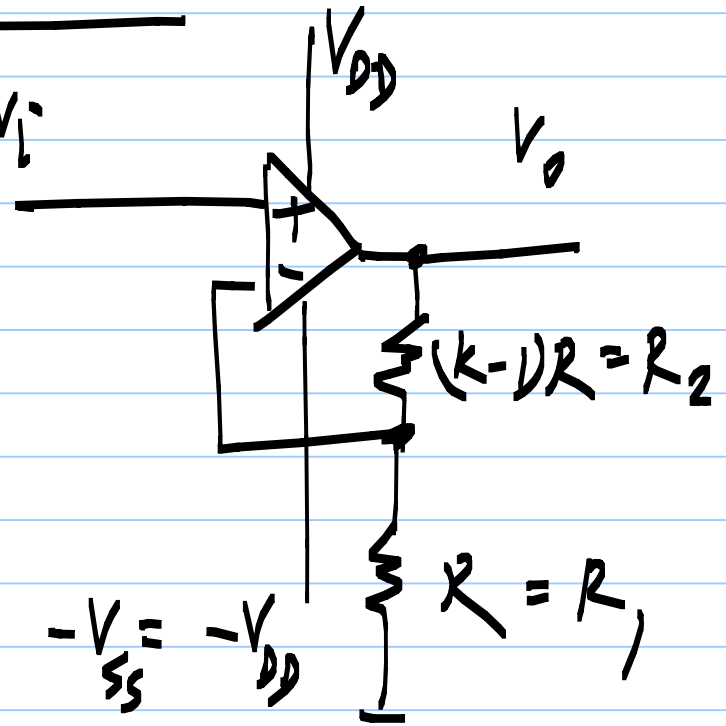
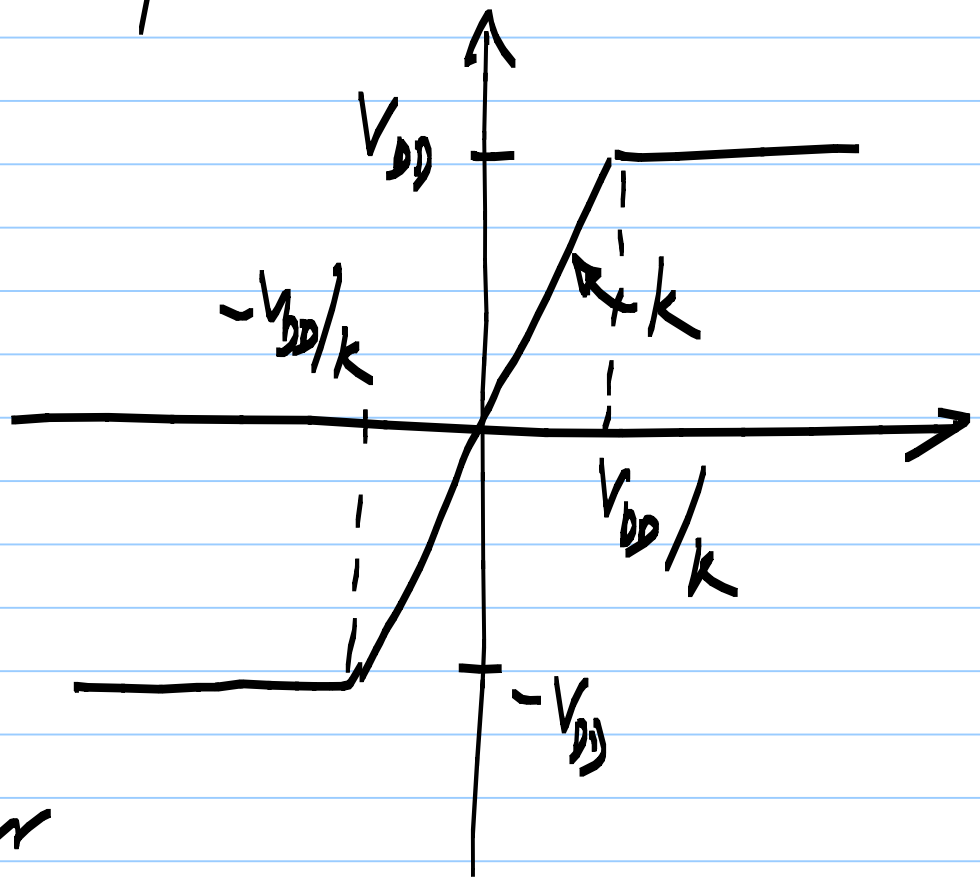
EE 2019

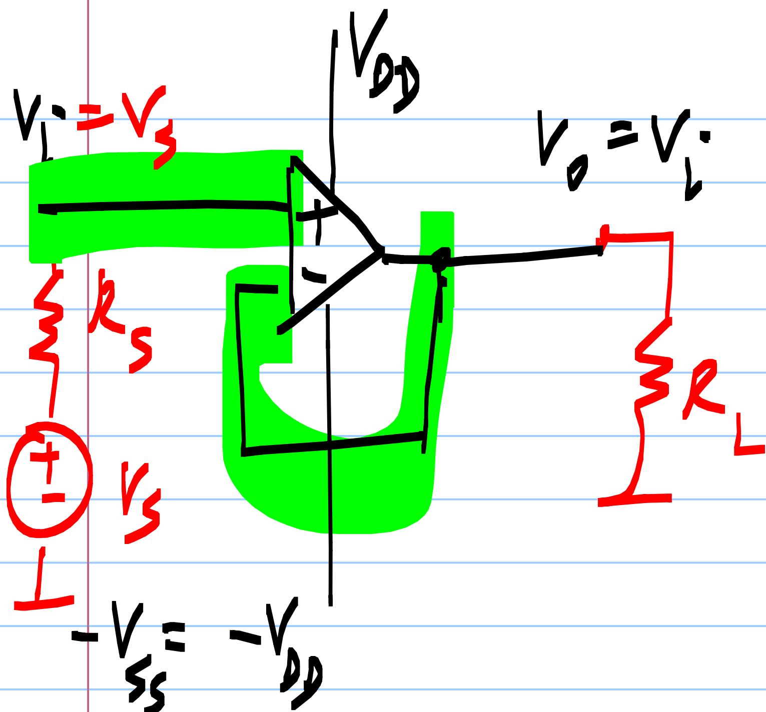
$k = 1 + \frac{R_2}{R_1}$

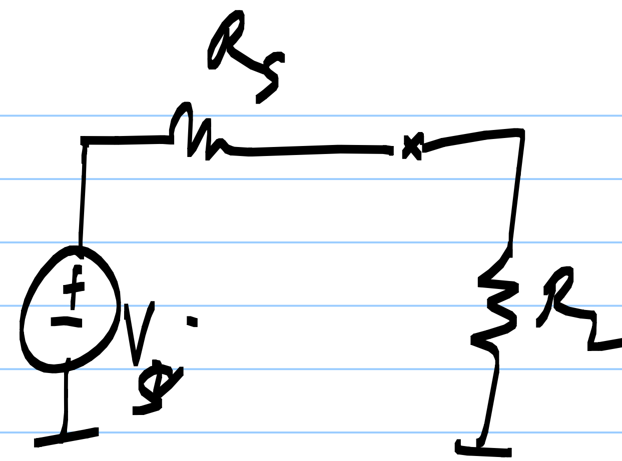
30/1/2019





Non-inverting amplifier

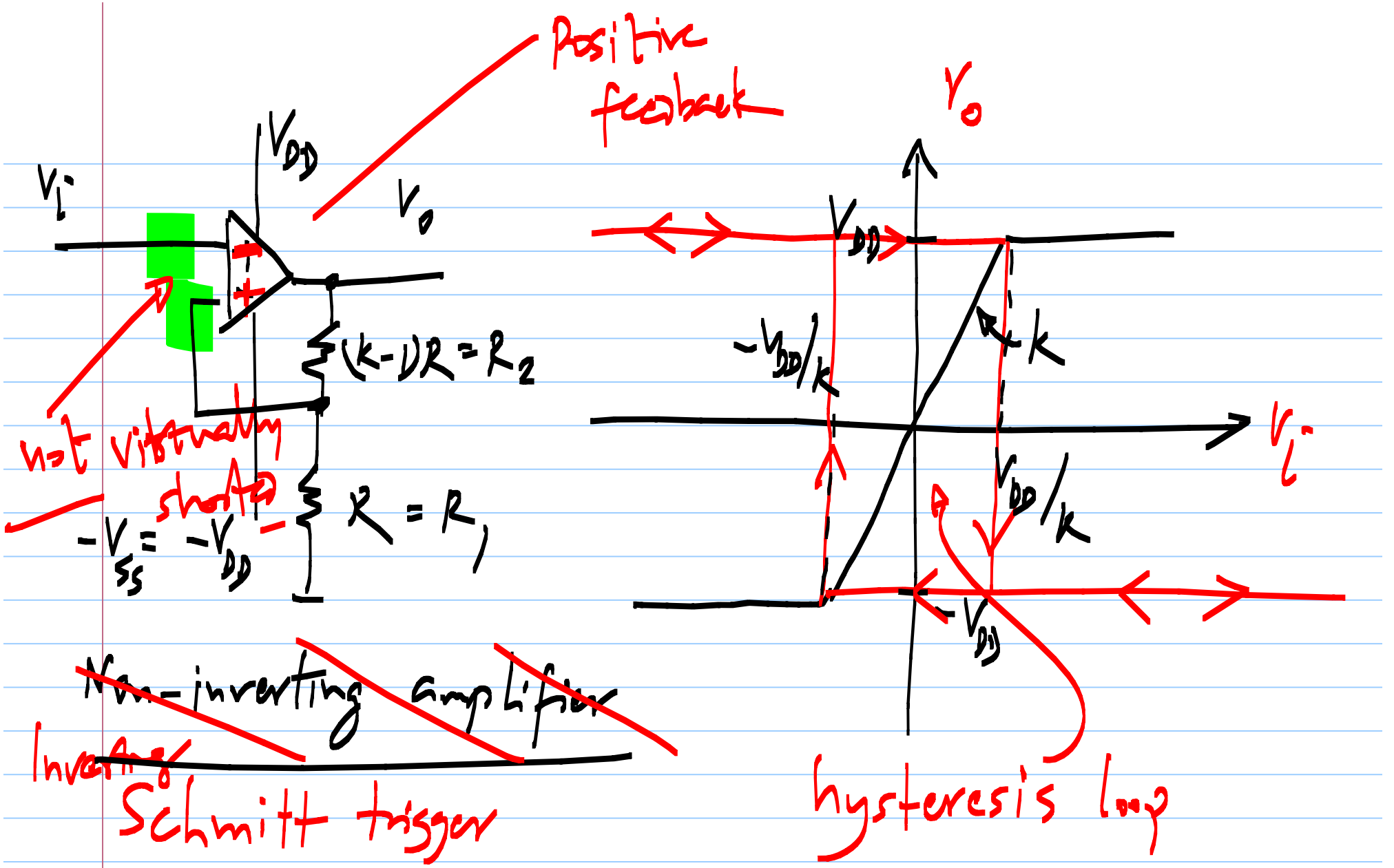




$V_o = V_i$

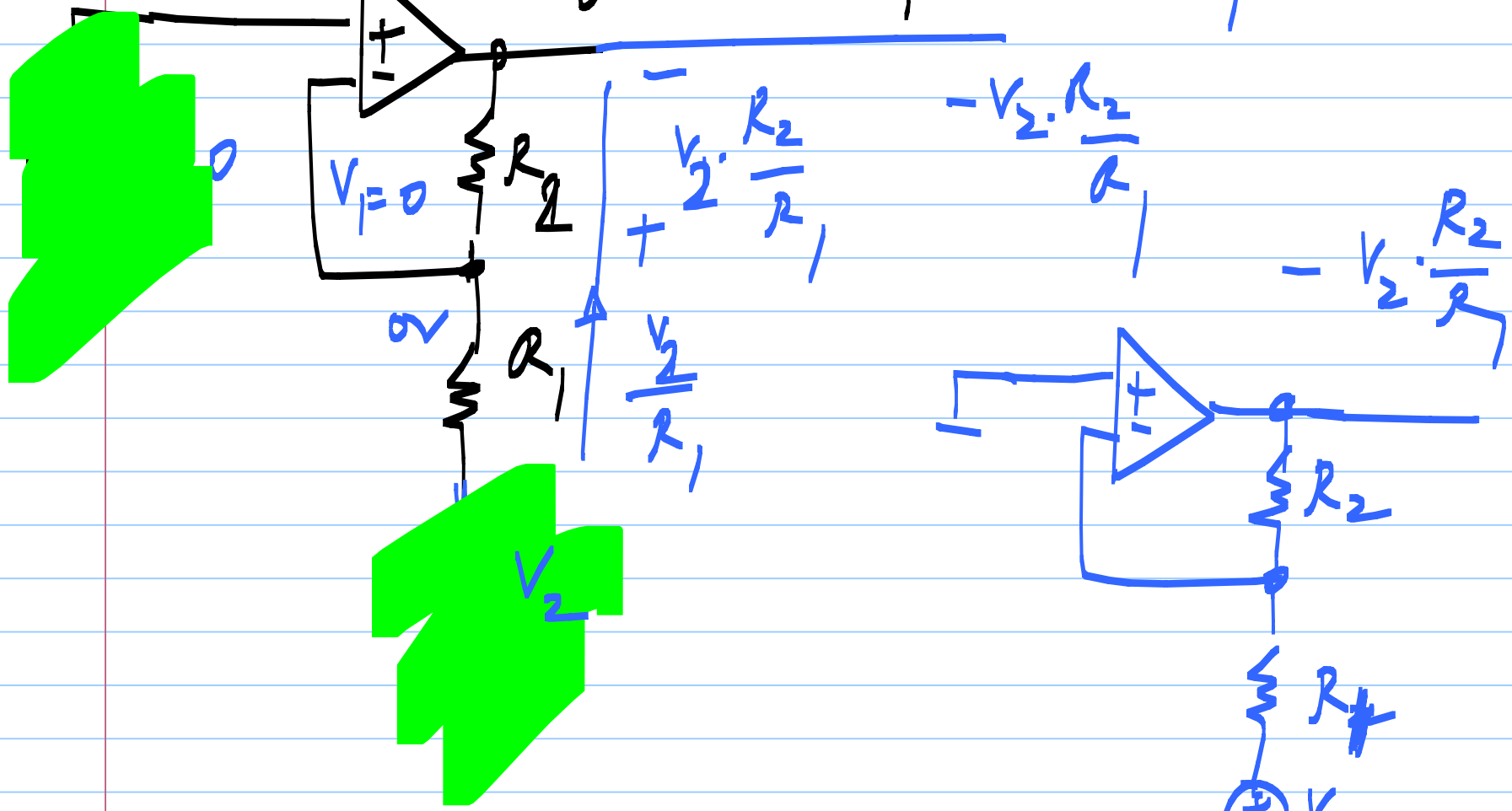
Voltage follower

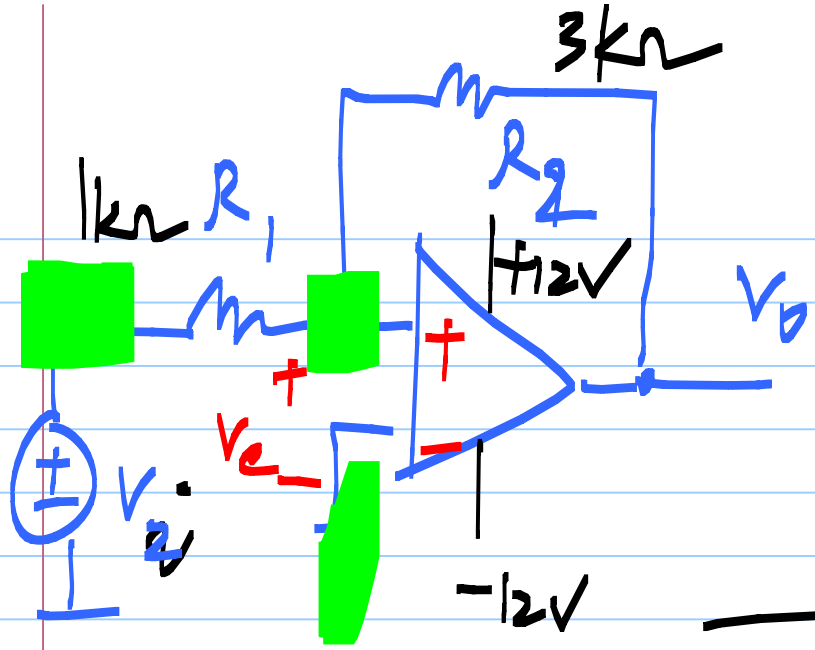
Buffer


Positive feedback
V_{DD}
V_i
V_o
$(k-1)R = R_2$
$R = R_1$
$-V_{SS} = -V_{DD}$
not virtually shorted
Non-inverting amplifier
Inverting
Schmitt trigger
V_o
V_{DD}
$-V_{DD}/k$
k
V_i
V_{DD}/k
$-V_{DD}$
hysteresis loop

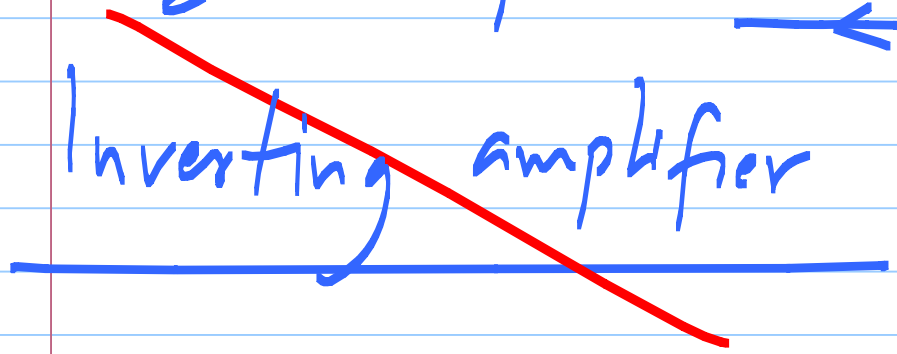
ideal opamp

$$V_o = V_1 \cdot \left(1 + \frac{R_2}{R_1}\right) - V_2 \cdot \frac{R_2}{R_1}$$

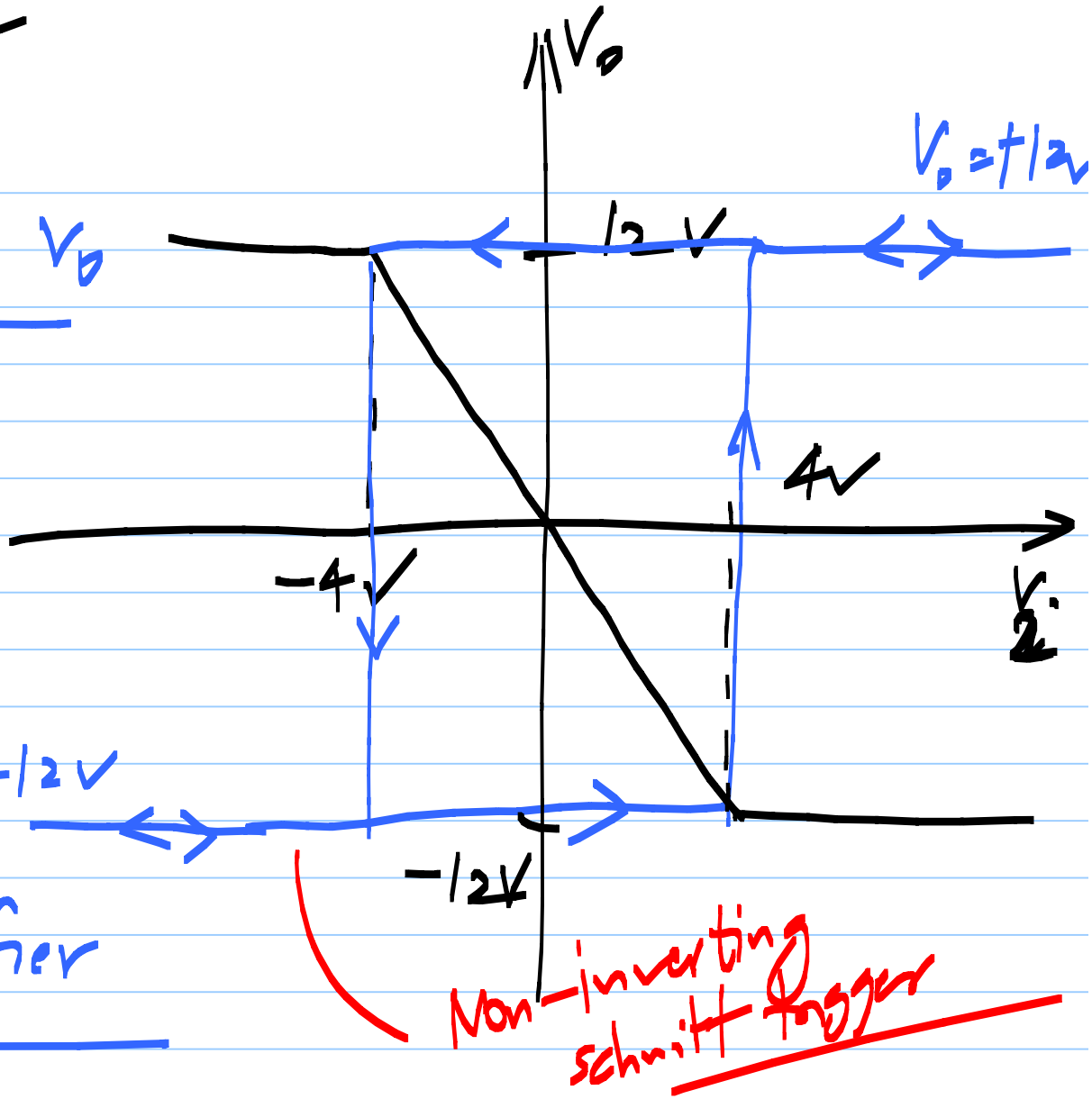




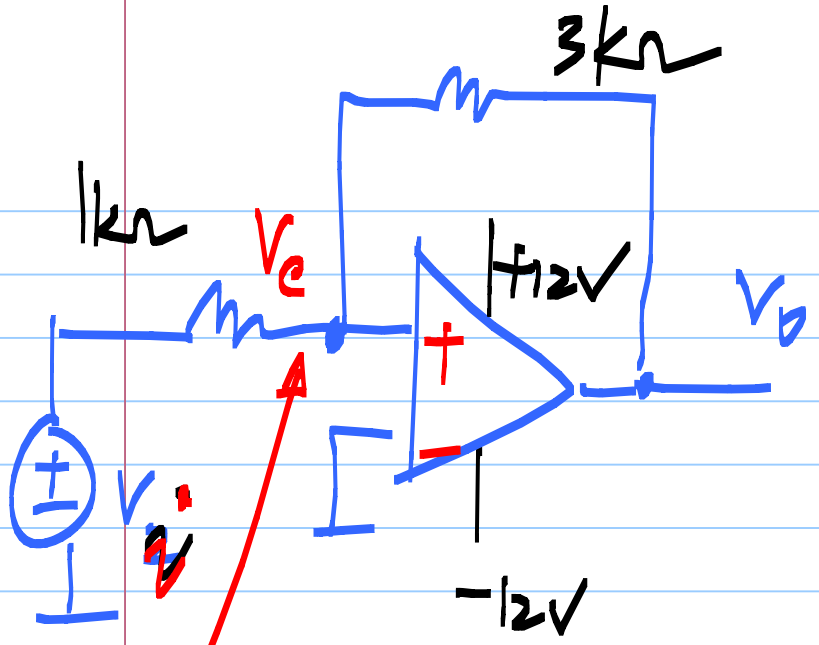
$$\frac{V_o}{V_i} = -\frac{R_2}{R_1}$$

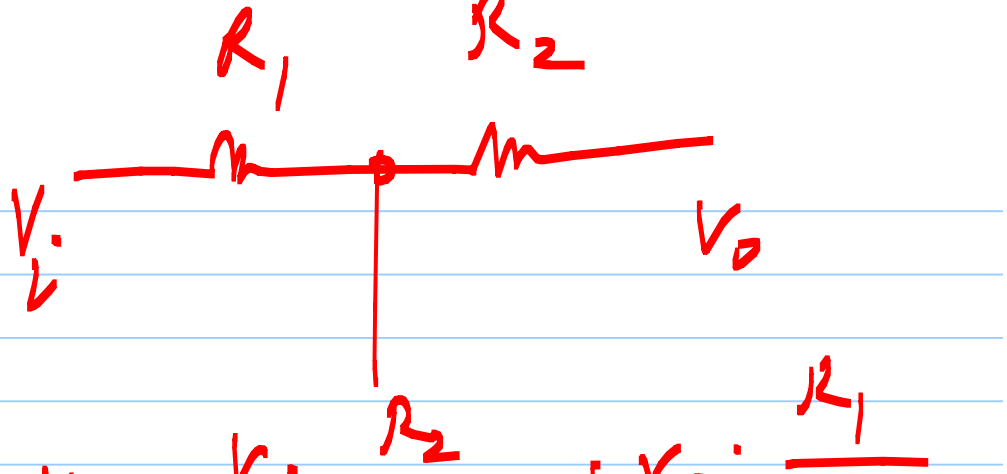


Inverting amplifier



Non-inverting schmitt trigger



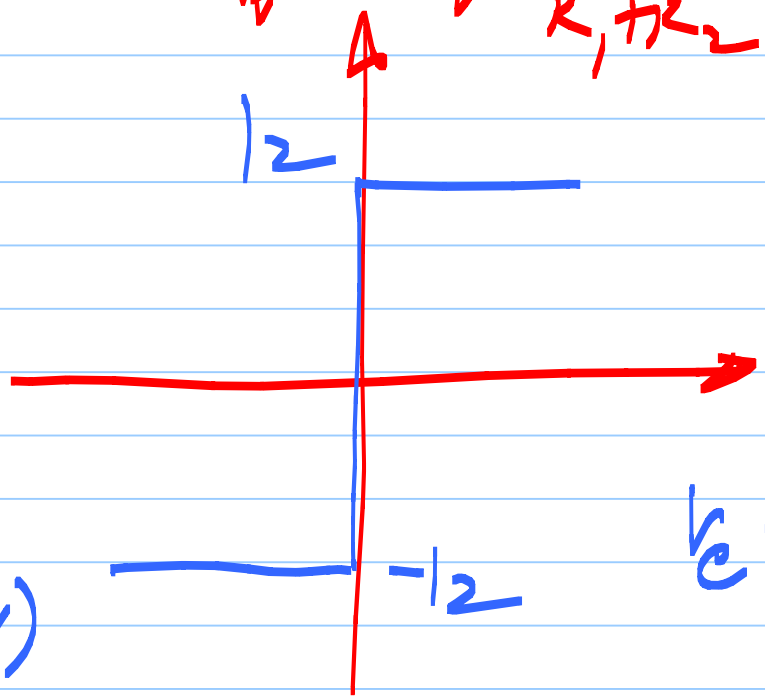


$$V_o \quad V_i \cdot \frac{R_2}{R_1+R_2} + V_o \cdot \frac{R_1}{R_1+R_2}$$

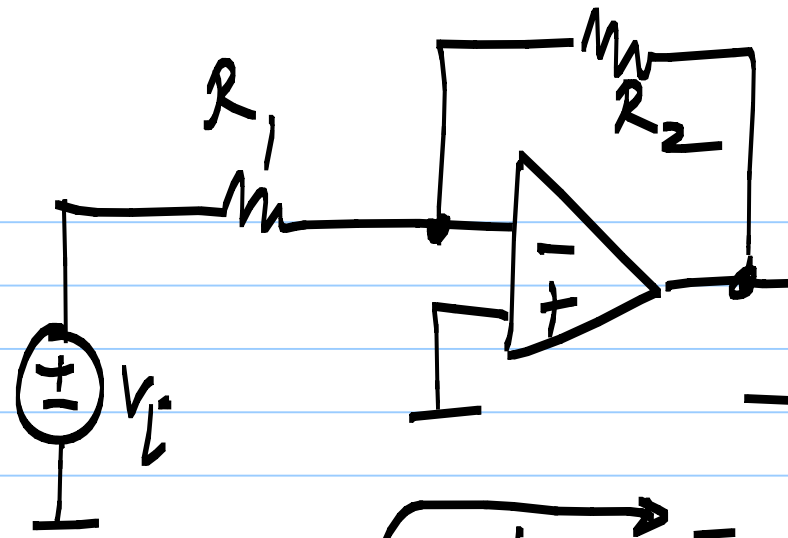
±12V

$$V_e = \frac{3}{4} V_i + \frac{1}{4} V_o$$

$$V_e = \frac{3}{4} V_i + \frac{1}{4}(-12V)$$

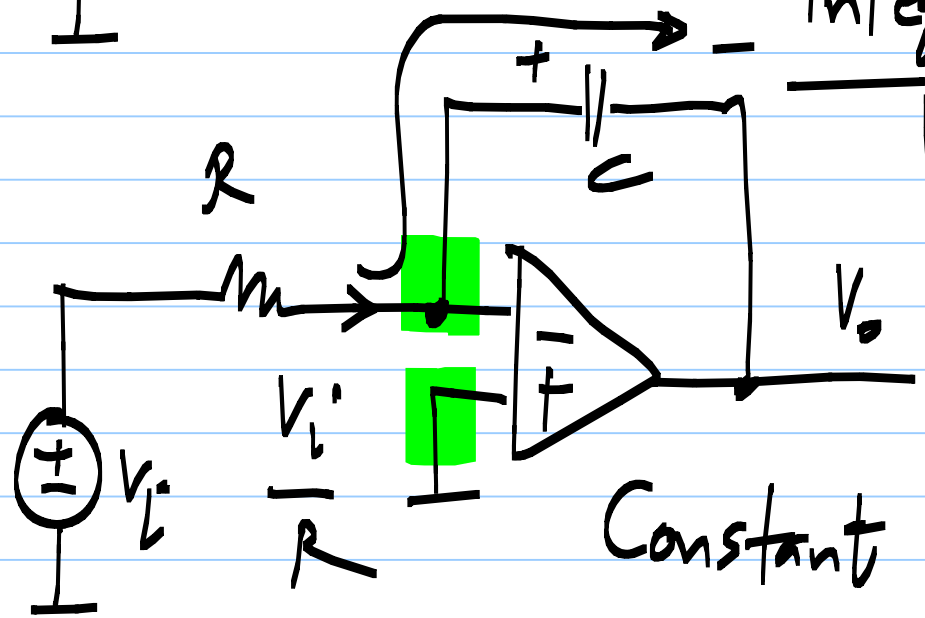


$$V_e = \frac{3}{4} V_i + \frac{1}{4}(12V)$$



$$V_o = -\frac{R_2}{R_1} \cdot V_i$$

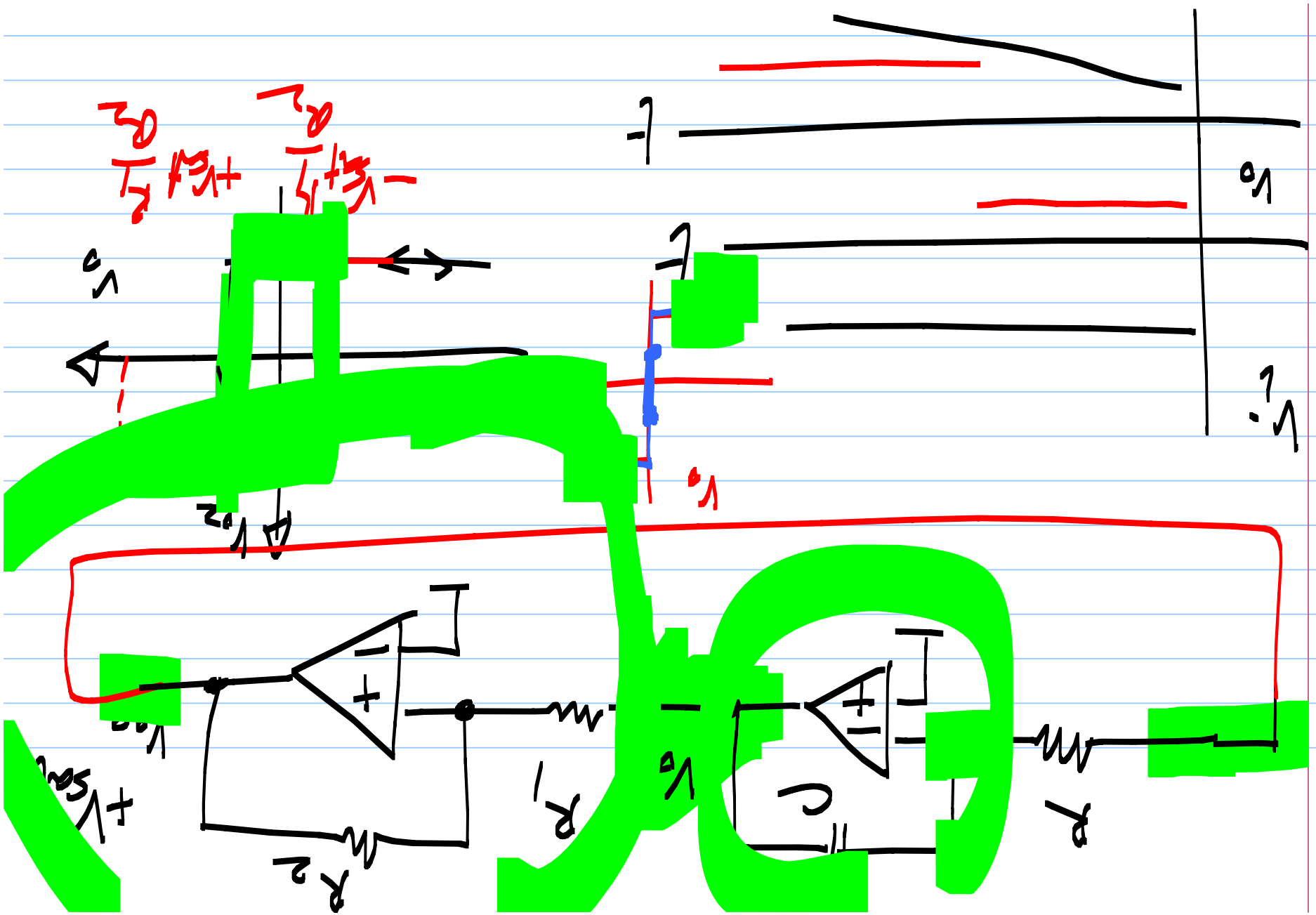
Integrator



$$V_o(t) = -\frac{1}{RC}\int_0^t v_i(t)\,dt + V_o(0)$$

Constant V_i:

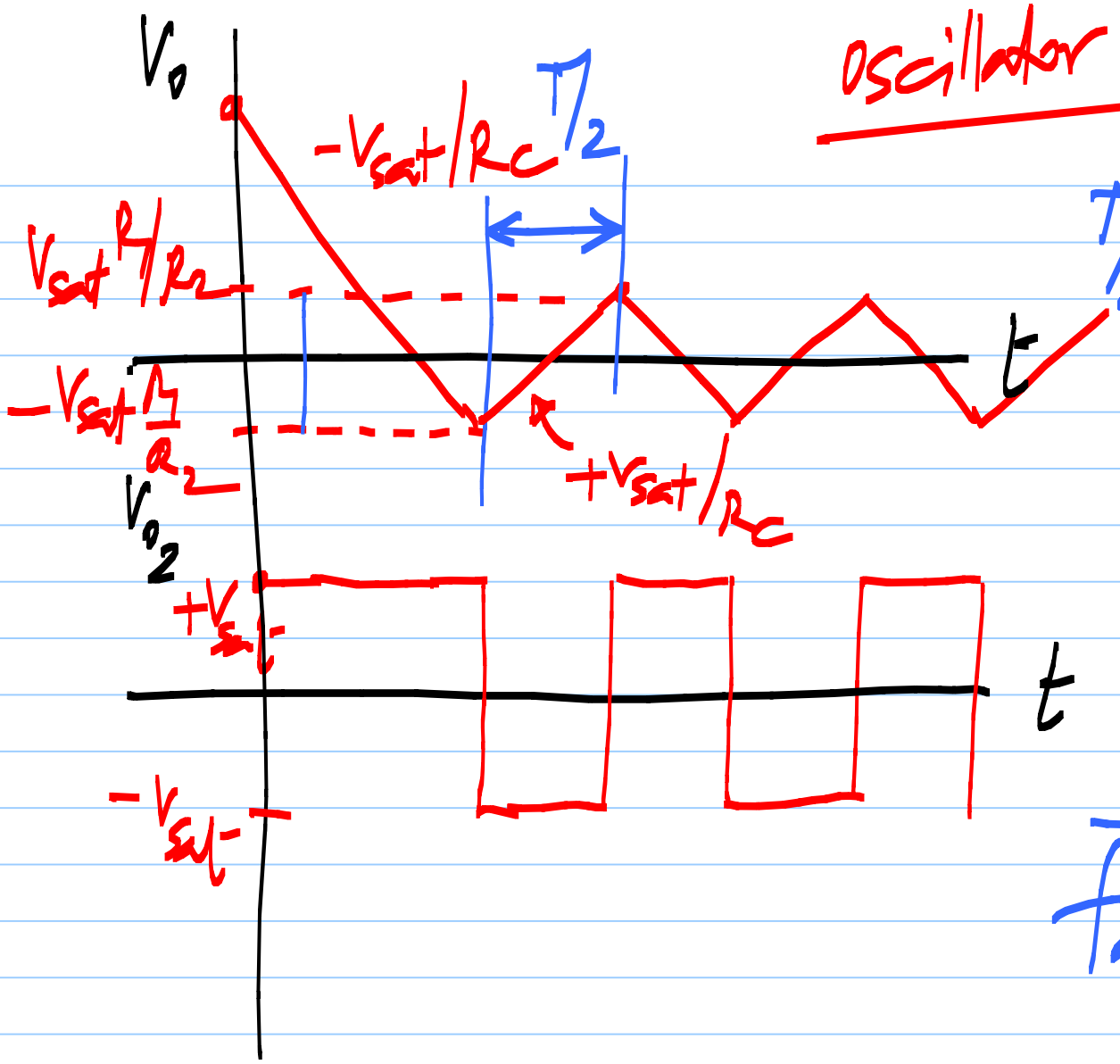
$$\frac{dV_o}{dt} = -\frac{V_i}{RC}$$



Initially v_o (o/p of the integrator) : large & +ve

→ V_{o2} (o/p of the schmitt trigger) = V_{sat}

oscillator



$$\frac{T}{2} = \frac{2V_{sat}\,R_1/R_2}{V_{sat}/R_C}$$

$$T_{osc} = 4 \cdot \frac{R_1}{R_2} \cdot R_C$$

$$f_{osc} = \frac{1}{4R_C \cdot \frac{R_1}{R_2}}$$