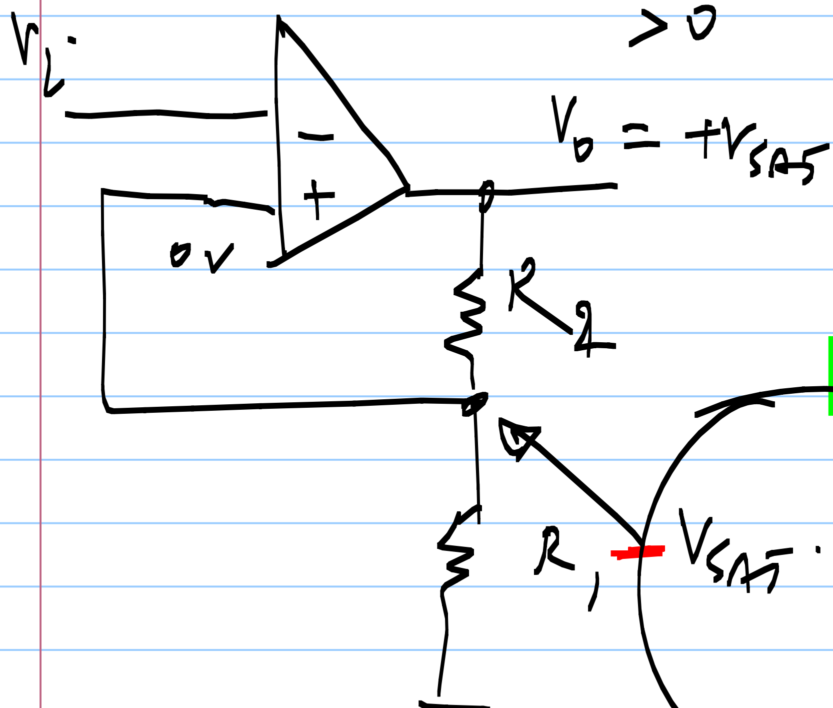
EE2019

Inverting schmitt trigger

14/2/2017

$v_i < 0 \quad v_o = +V_{sat}$

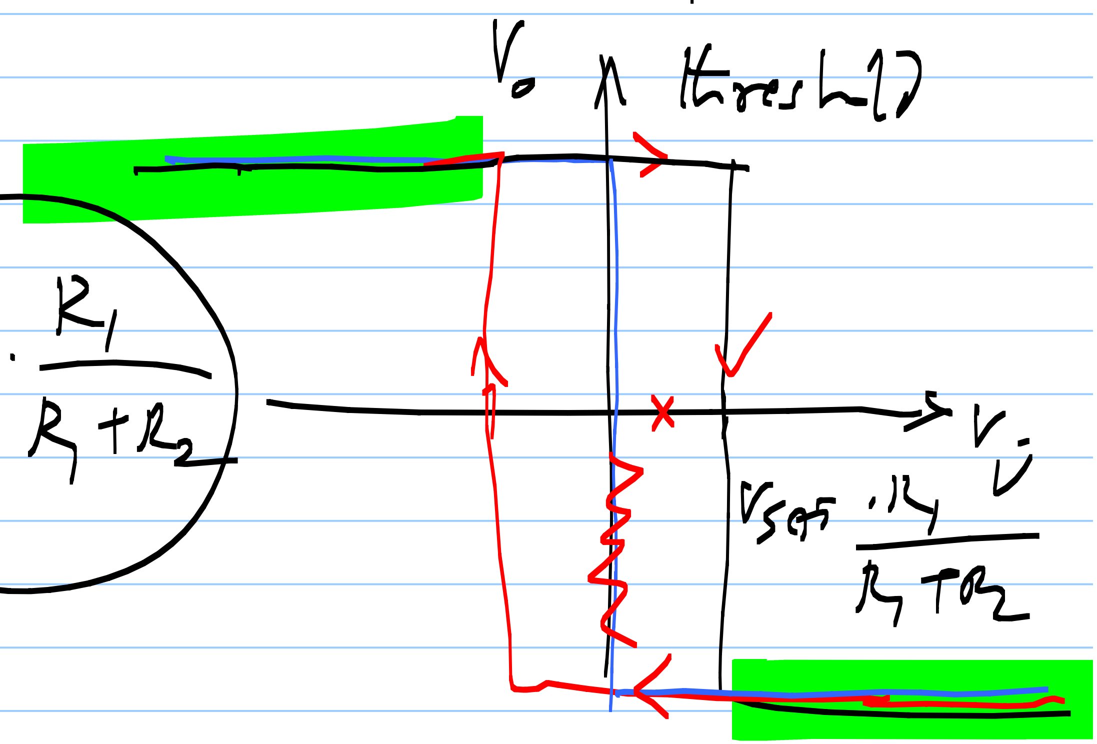
$ > 0 \quad v_o = -V_{sat}$



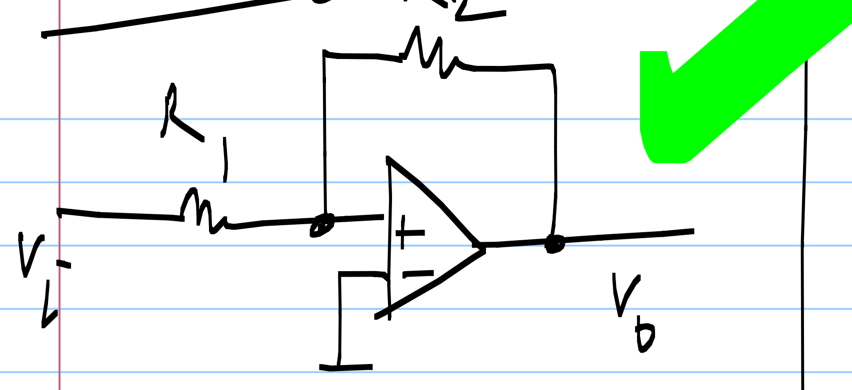
$$V_{sat} \cdot \frac{R_1}{R_1 + R_2}$$

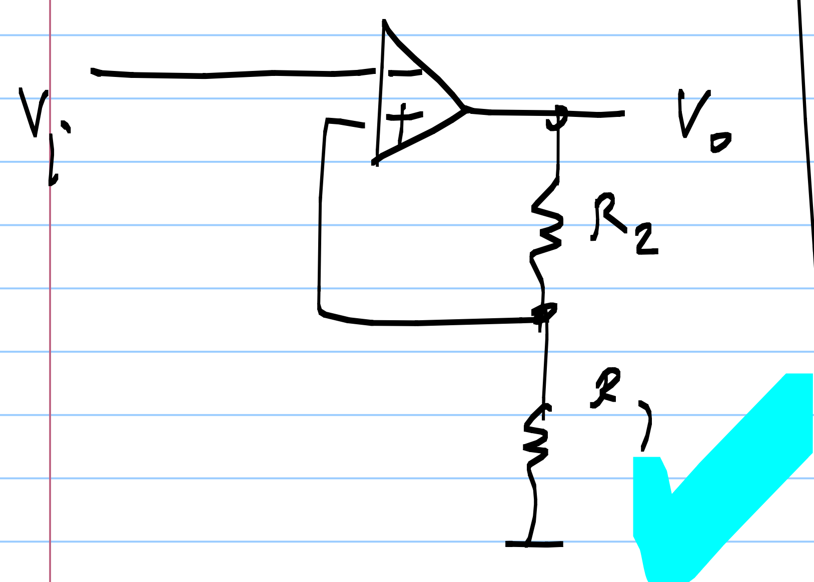
$v_i < 0$:

set a +ve threshold

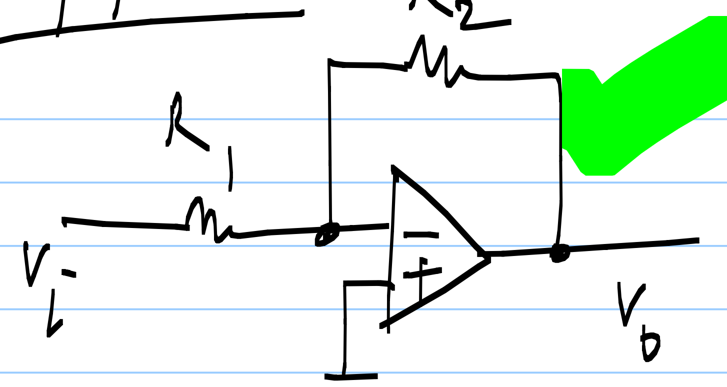


Schmitt trigger

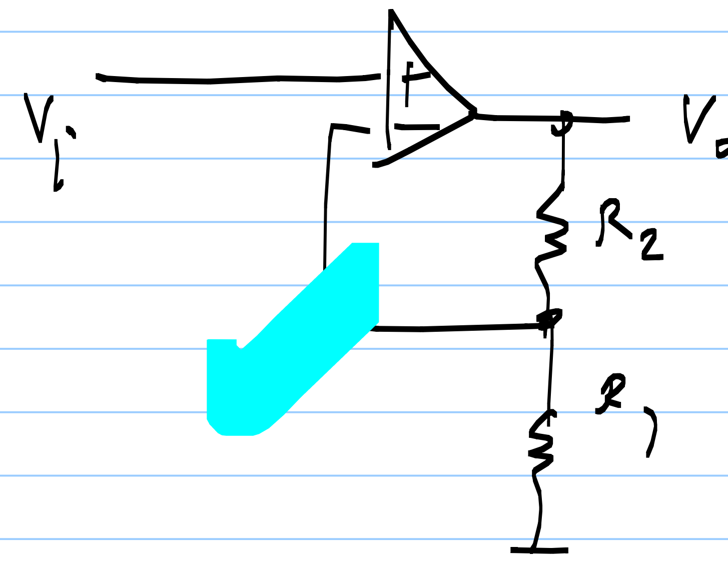


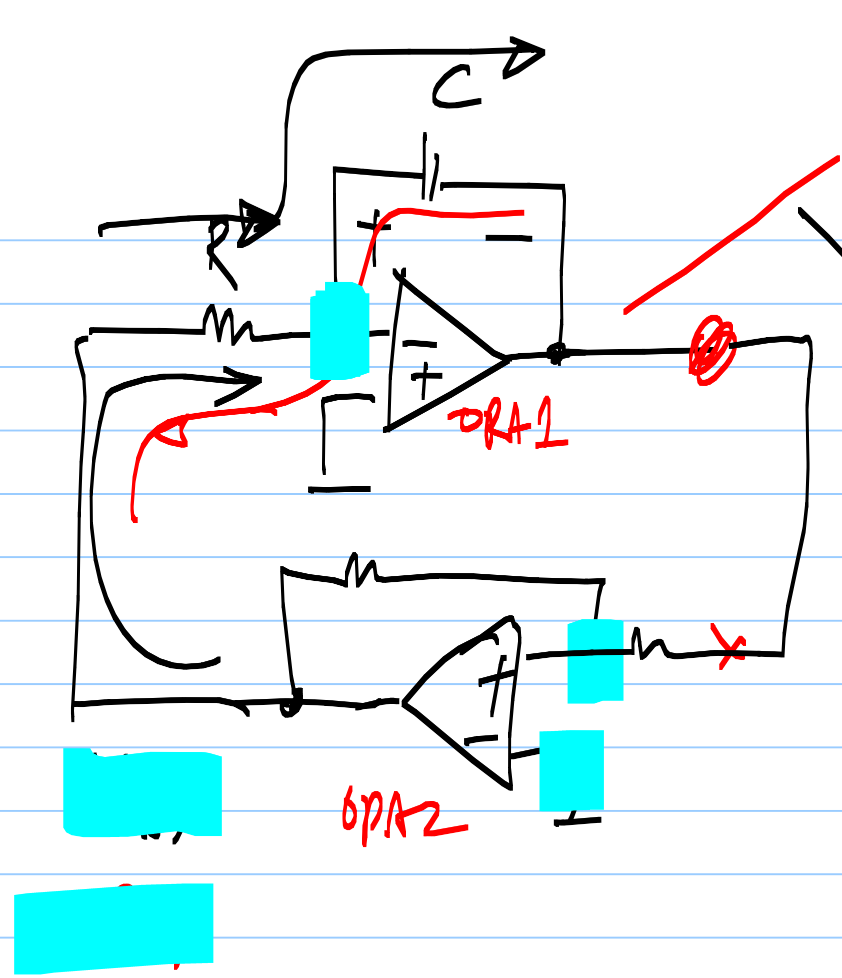


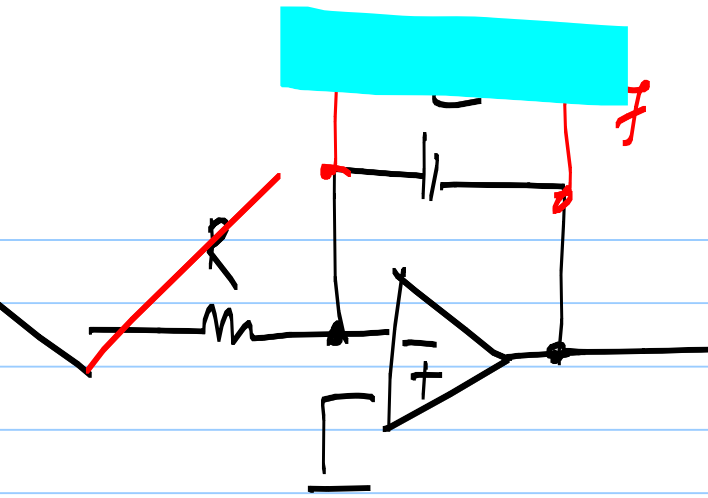
Amplifier



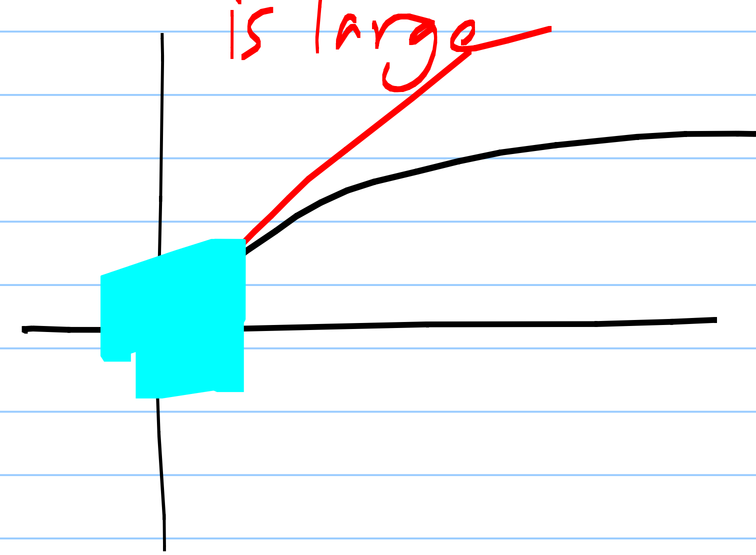
V_o vs V_i





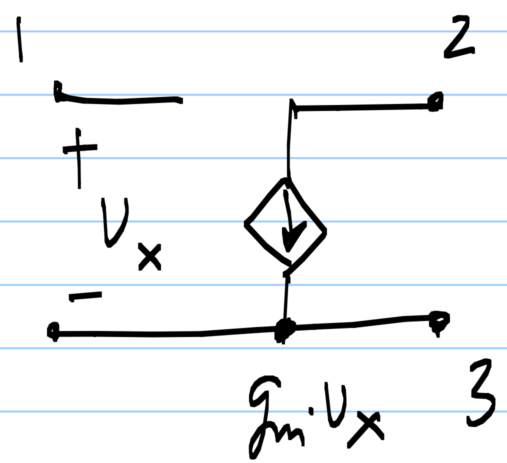


$\simeq$ integrator if $\frac{R_f}{R}$ is large

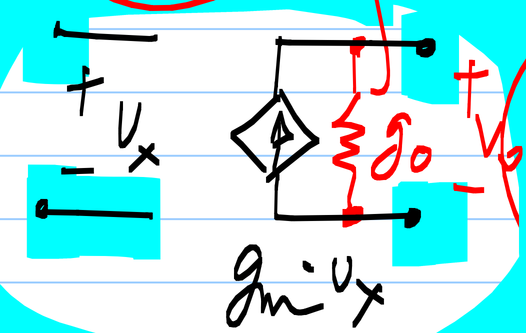


Opamp – made using transistors

VCCS

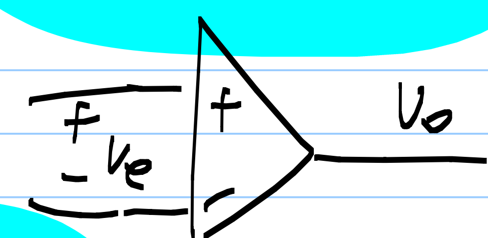


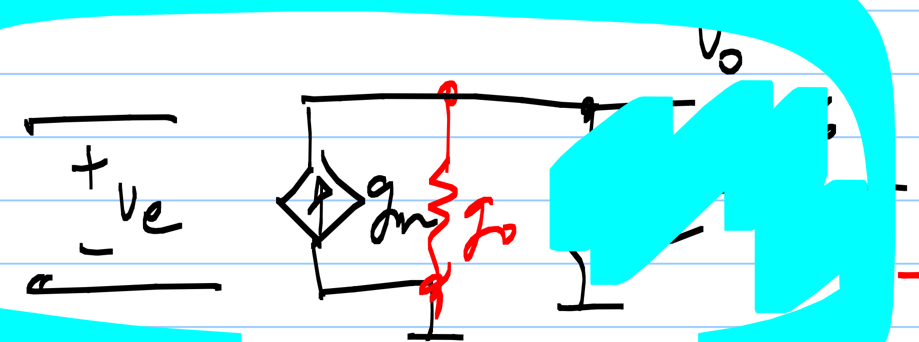
$\frac{g_m}{g_o} \approx 100$



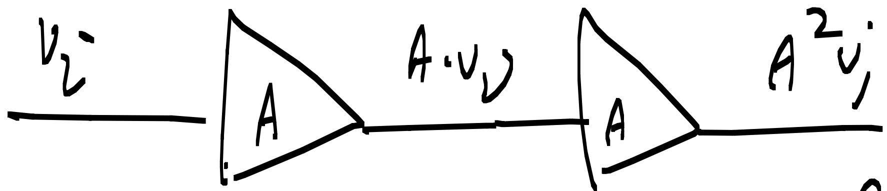
$\frac{v_o}{v_x} = \frac{g_m}{g_o}$

$A_o = 10^6$



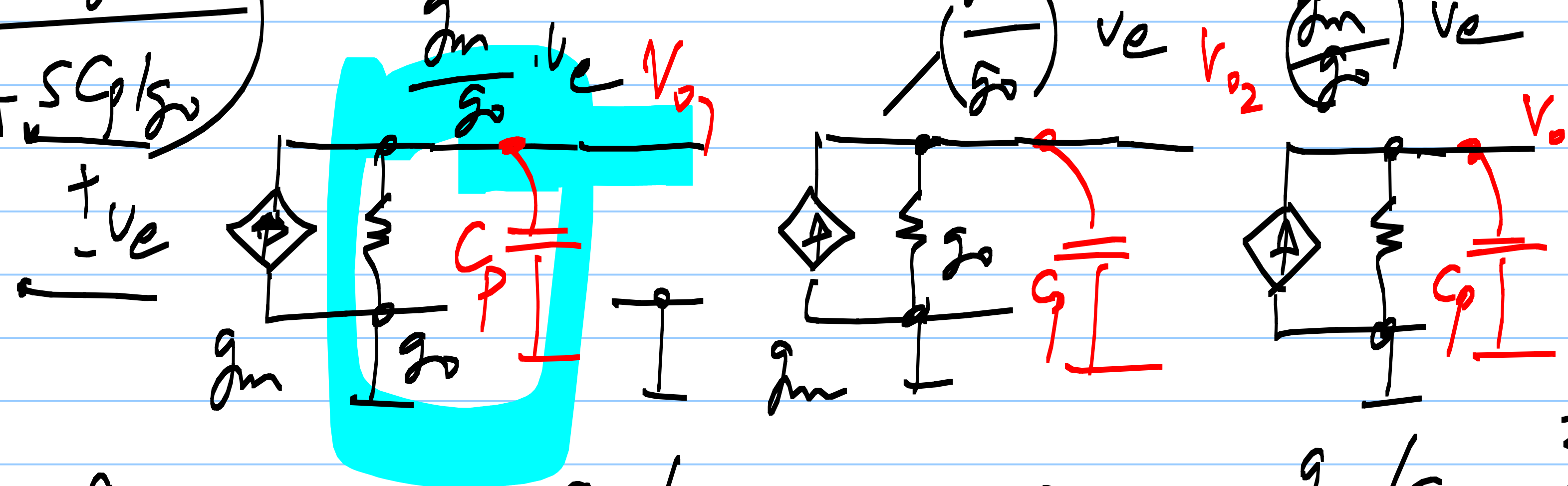


$\frac{v_o}{v_e} = \frac{g_m}{g_o + G_L} \approx 100$

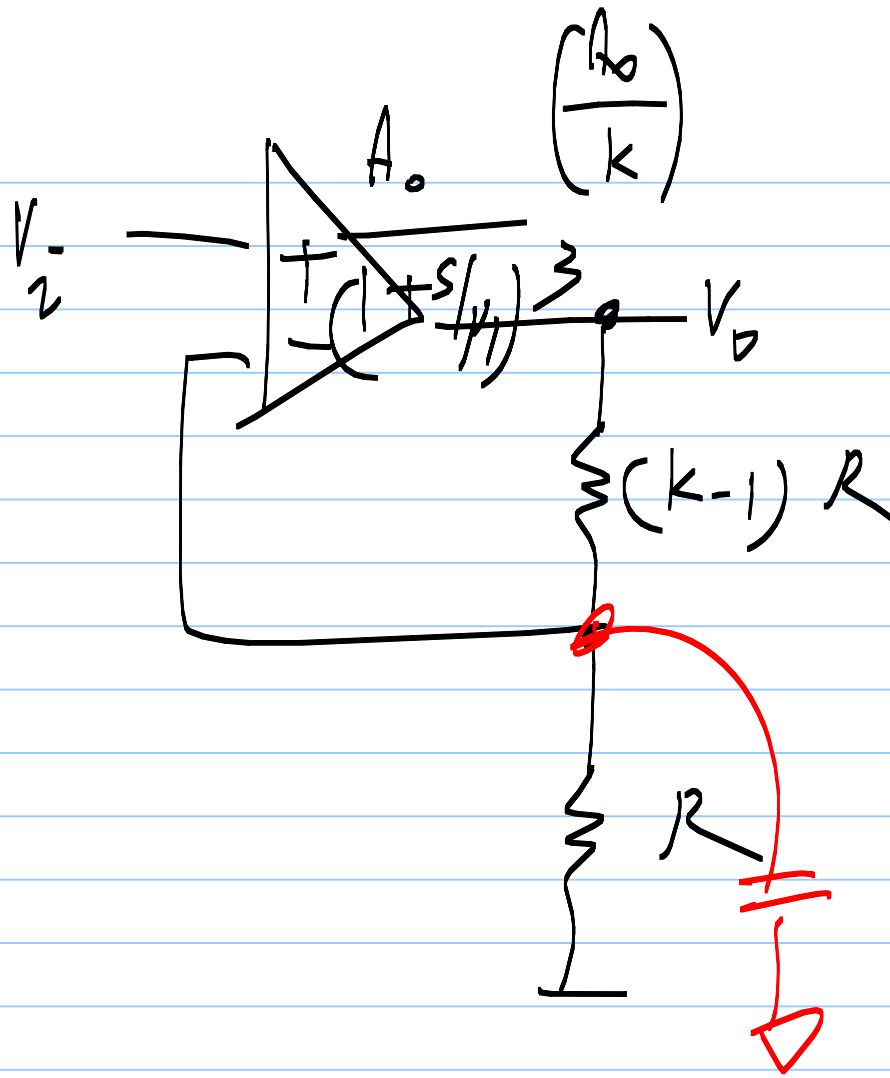


$\underbrace{\qquad\qquad}_{2}$ Cascade

$$\frac{V_{o_2}}{V_e} = \left(\frac{g_m/g_o}{1+sC_p/g_o}\right)^2$$

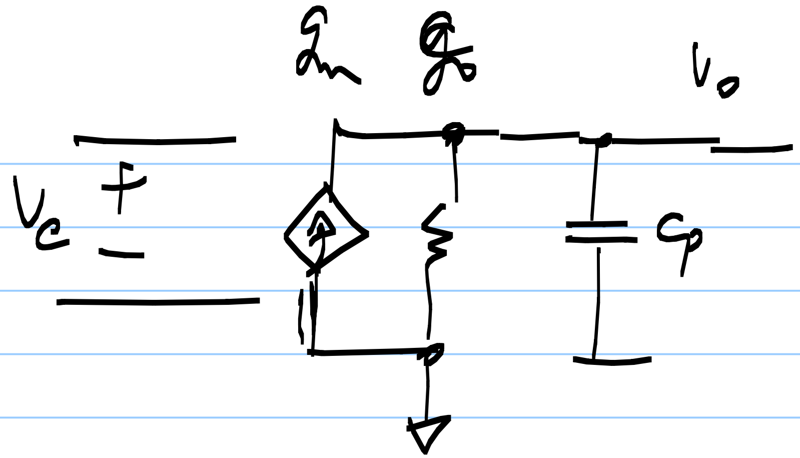


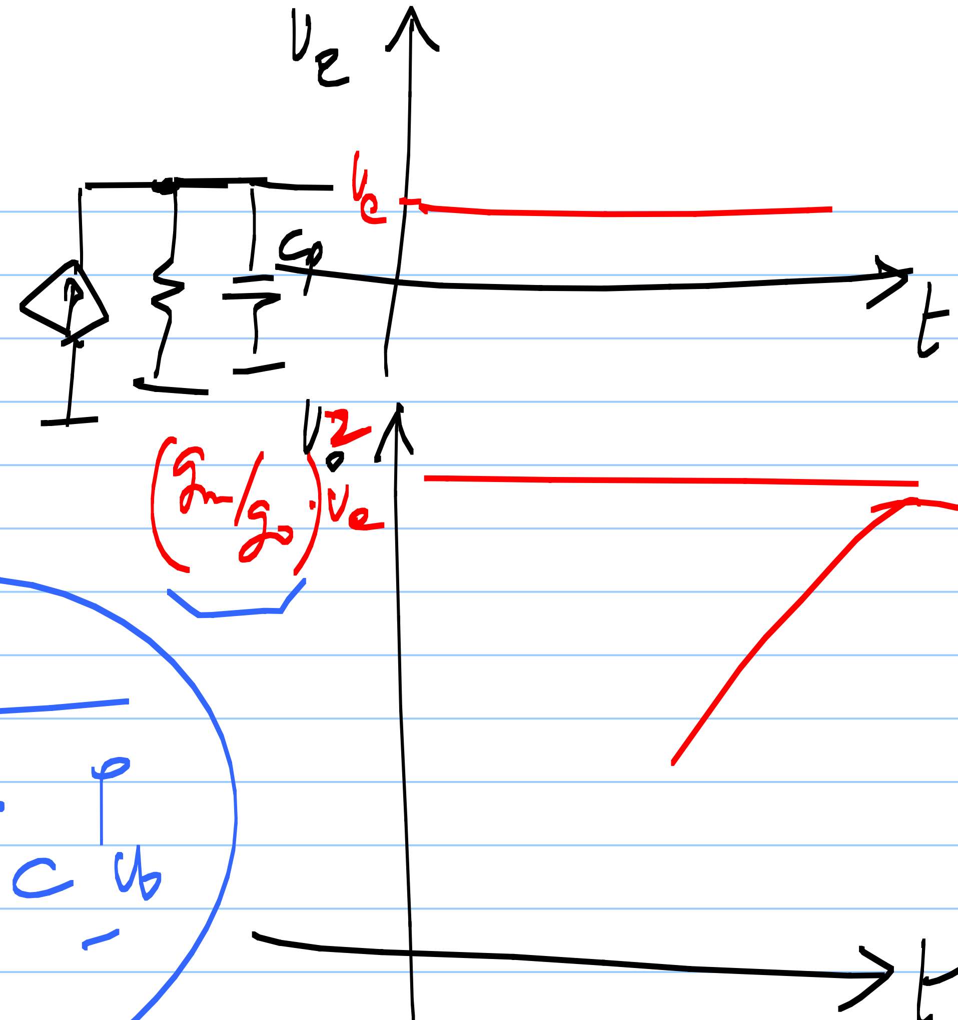
$$\frac{V_{o_1}}{V_e} = \frac{g_m}{g_o+sC_p} = \underbrace{\frac{g_m/g_o}{1+s\,C_p/g_o}}\;;\quad \frac{V_o}{V_e} = \underbrace{\left(\frac{g_m/g_o}{1+sC_p/g_o}\right)^3}$$



$$\frac{v_o}{v_i} = \frac{k}{1+\frac{k}{A_o}}$$

$$\left(\frac{A_o}{k}\right) =$$





$$\frac{g_m/g_o}{1 + s\,C_p/g_o}$$