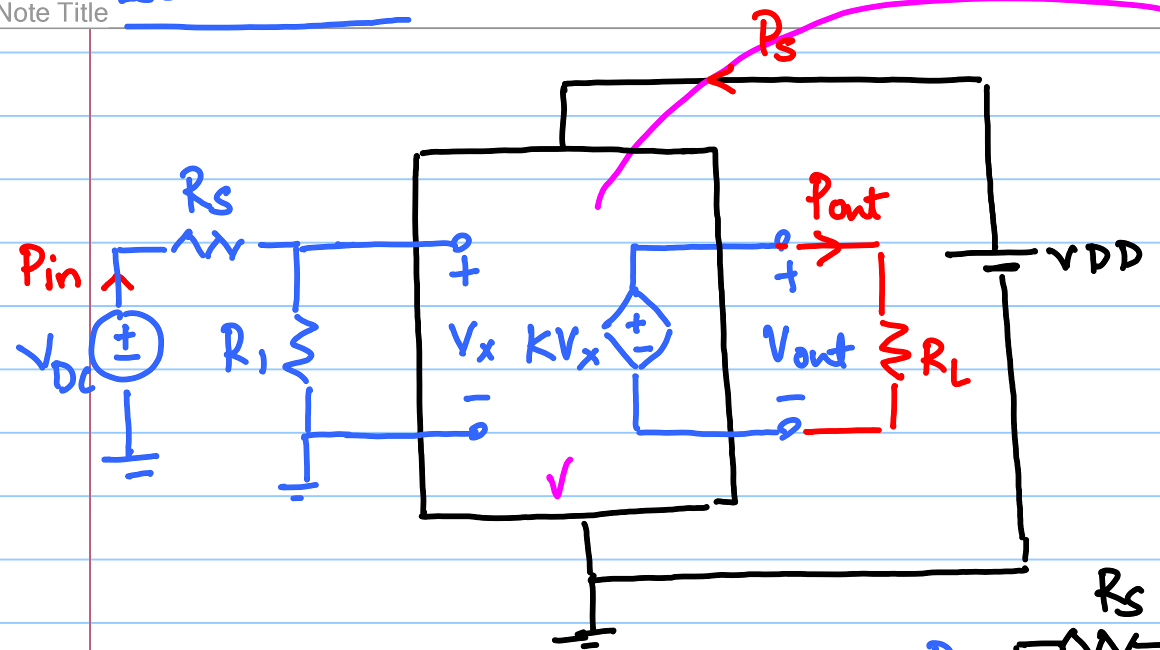
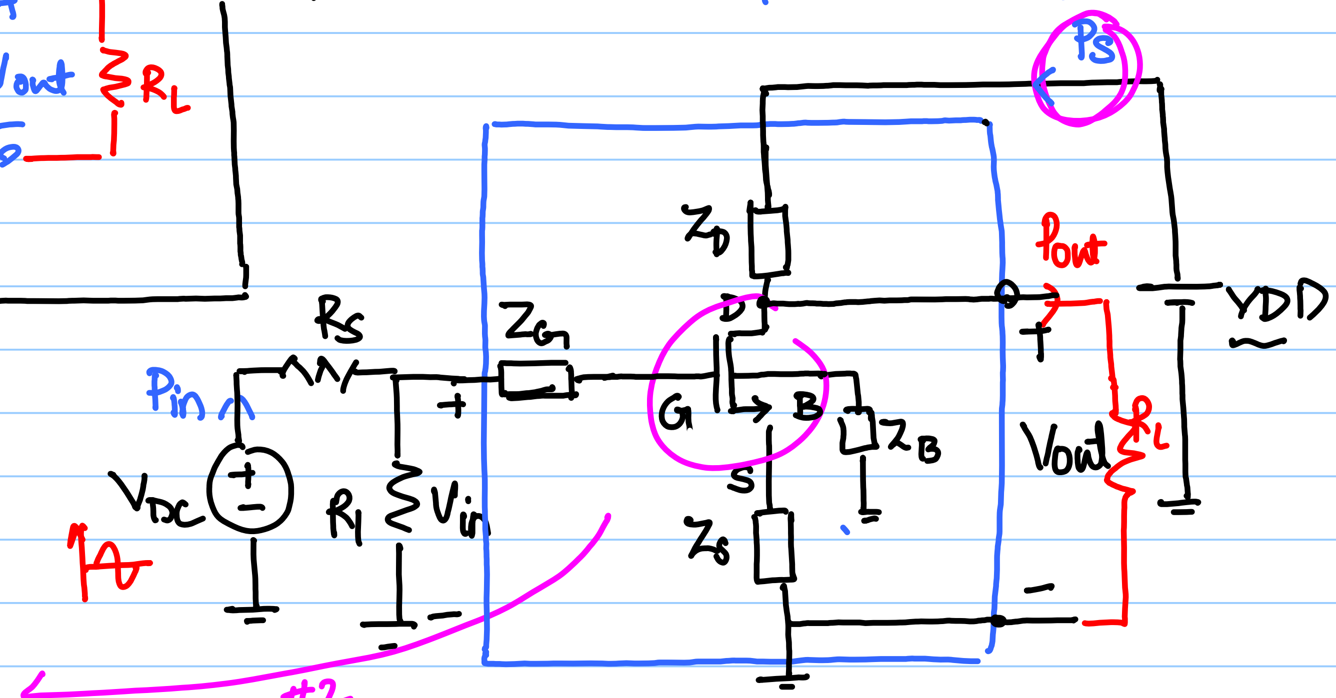
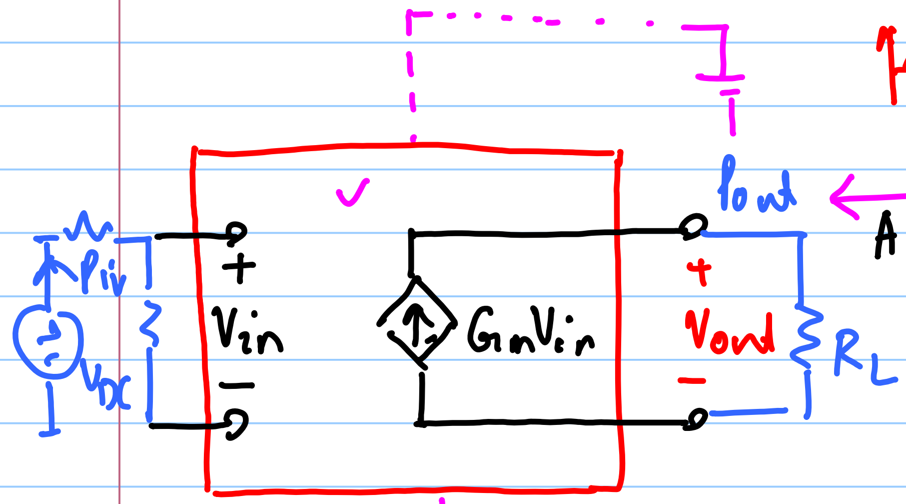
Note Title 05-02-2021

lecture # 04



MOSFET : Metal-Oxide-Semiconductor Field Effect transistor





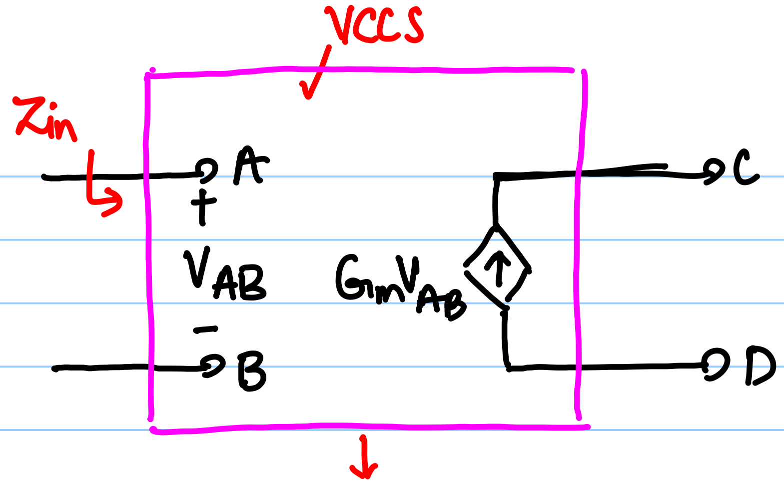
Approx.

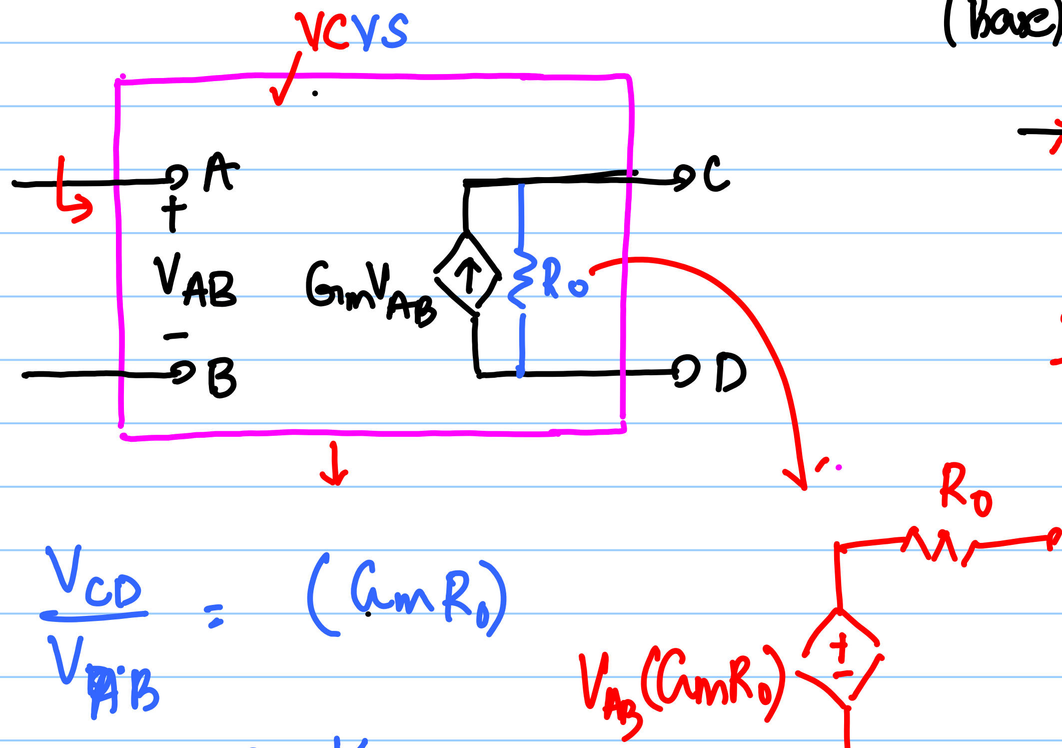
$P_{out} \geq P_{in}$

$P_{out} \leq P_{in} + P_S$

VCCS

$V_{out} = G_m V_{in} \cdot R_L = (G_m R_L) V_{in}$; $P_{out} > P_{in}$

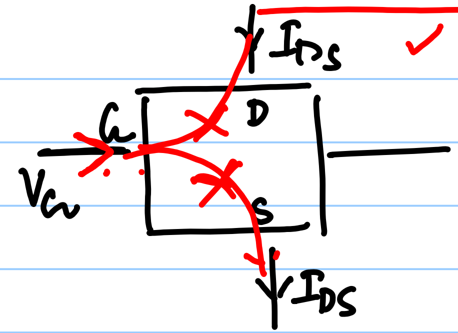


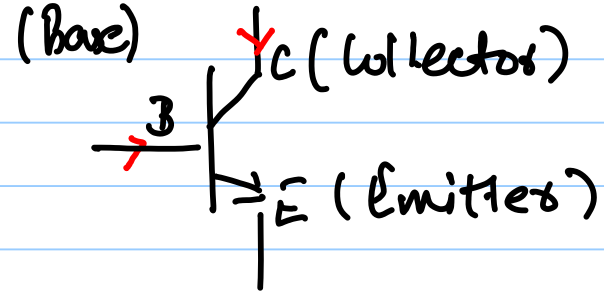


$$\frac{V_{CD}}{V_{AB}} = (G_m R_0)$$

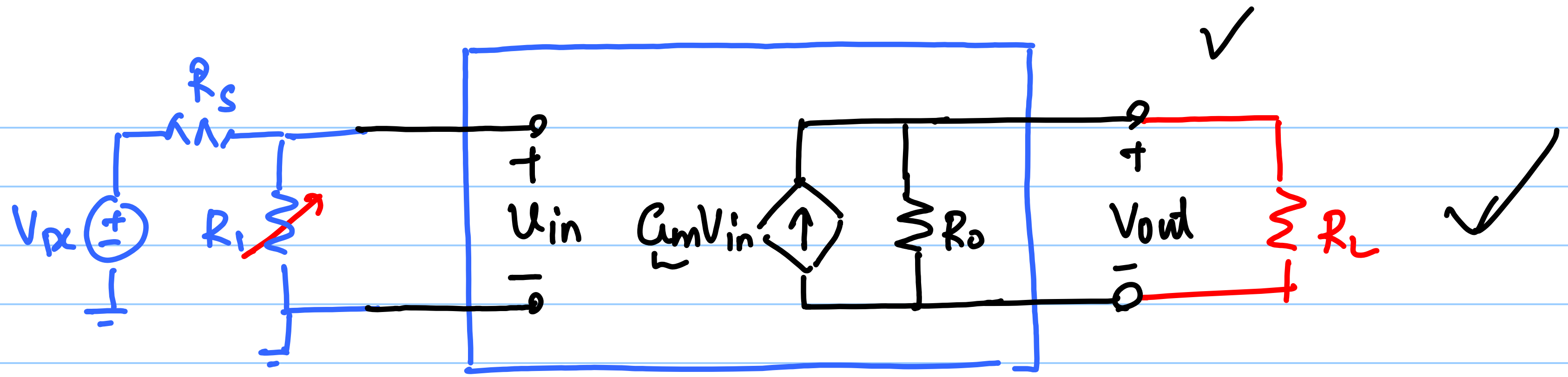
$$= K$$

$I_{DS} = f(V_G, V_D, V_S, V_B)$





$I_{CE} = f(V_B, V_C, V_E)$

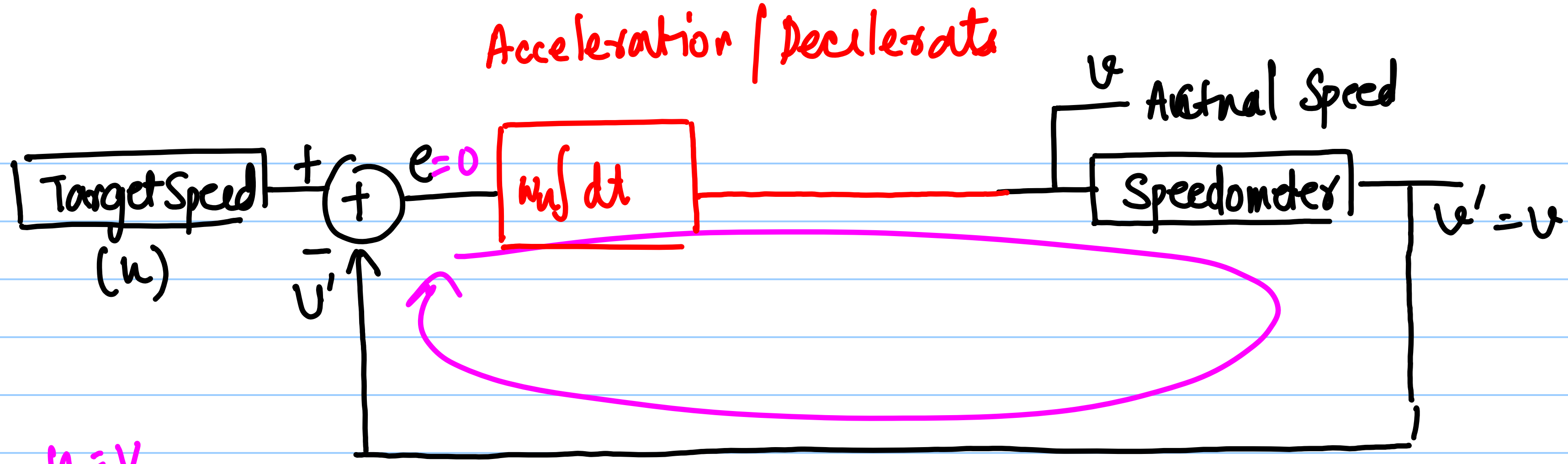


$$V_{out} = \frac{R_1}{R_1 + R_S} V_{DC} \times G_m (R_o \| R_L)$$

- G_m, R_o process, voltage, temperature (PVT) dependent parameters.

$$\frac{V_{out}}{V_{in}} \approx 10$$

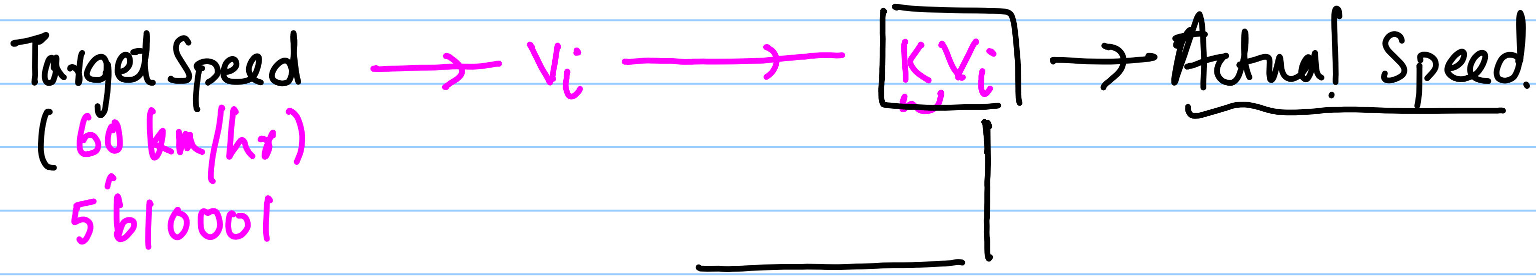
Ex:

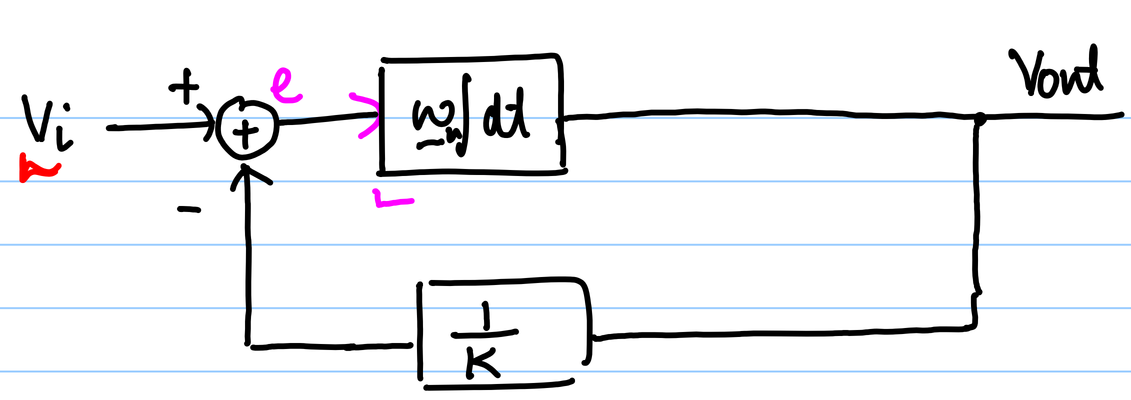


u=v

$V = \alpha \uparrow t$

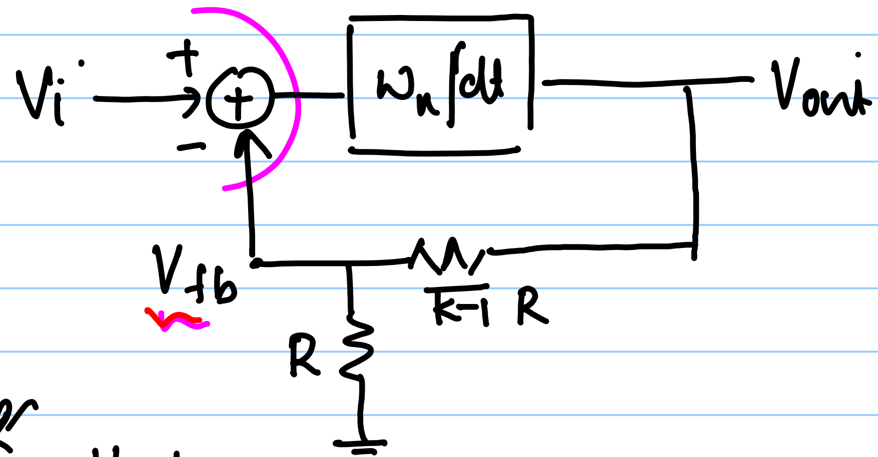
Tesla



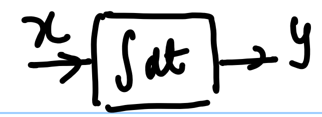


$$V_{out} = K V_i \checkmark$$

$$\frac{V_{out}}{K} = V_i$$

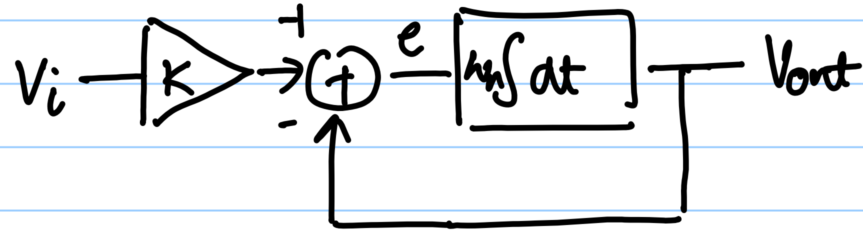


$$V_{fb} = \frac{R}{KR} V_{out}$$

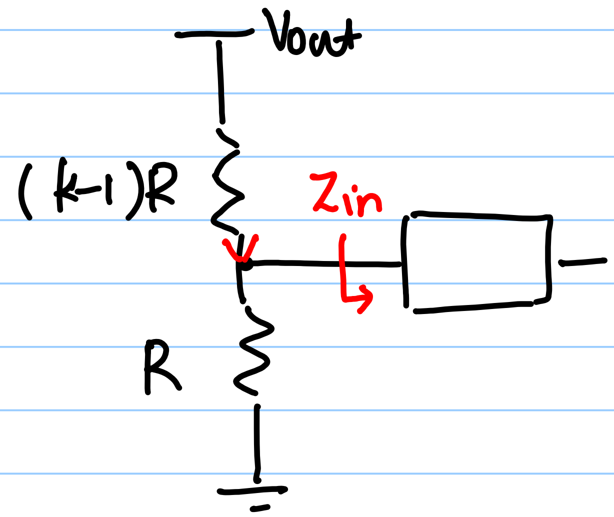


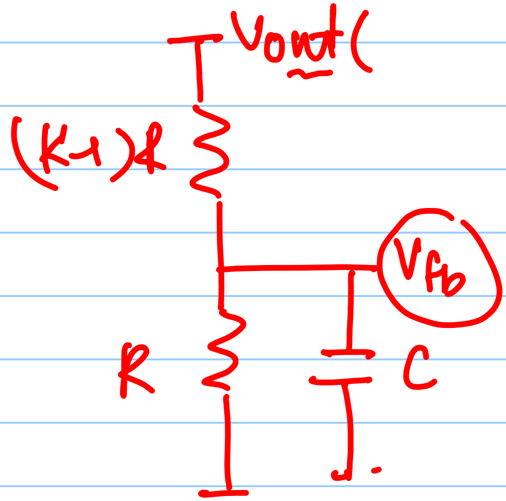
$$y = \int x \, dt$$

$$V_{out} = \omega_n \int_0^t e \, dt + V_{out}(0)$$



$$e = K V_i - V_{out}$$





$$V_{fb} = \frac{R \| \frac{1}{sC}}{(k-1) + \left(R \| \frac{1}{sC}\right)} V_{out}$$

#1 $Z_{in} = \infty$

#2 $Z_{in}(0) = \infty$, $Z_{in}(\omega)$ is finite