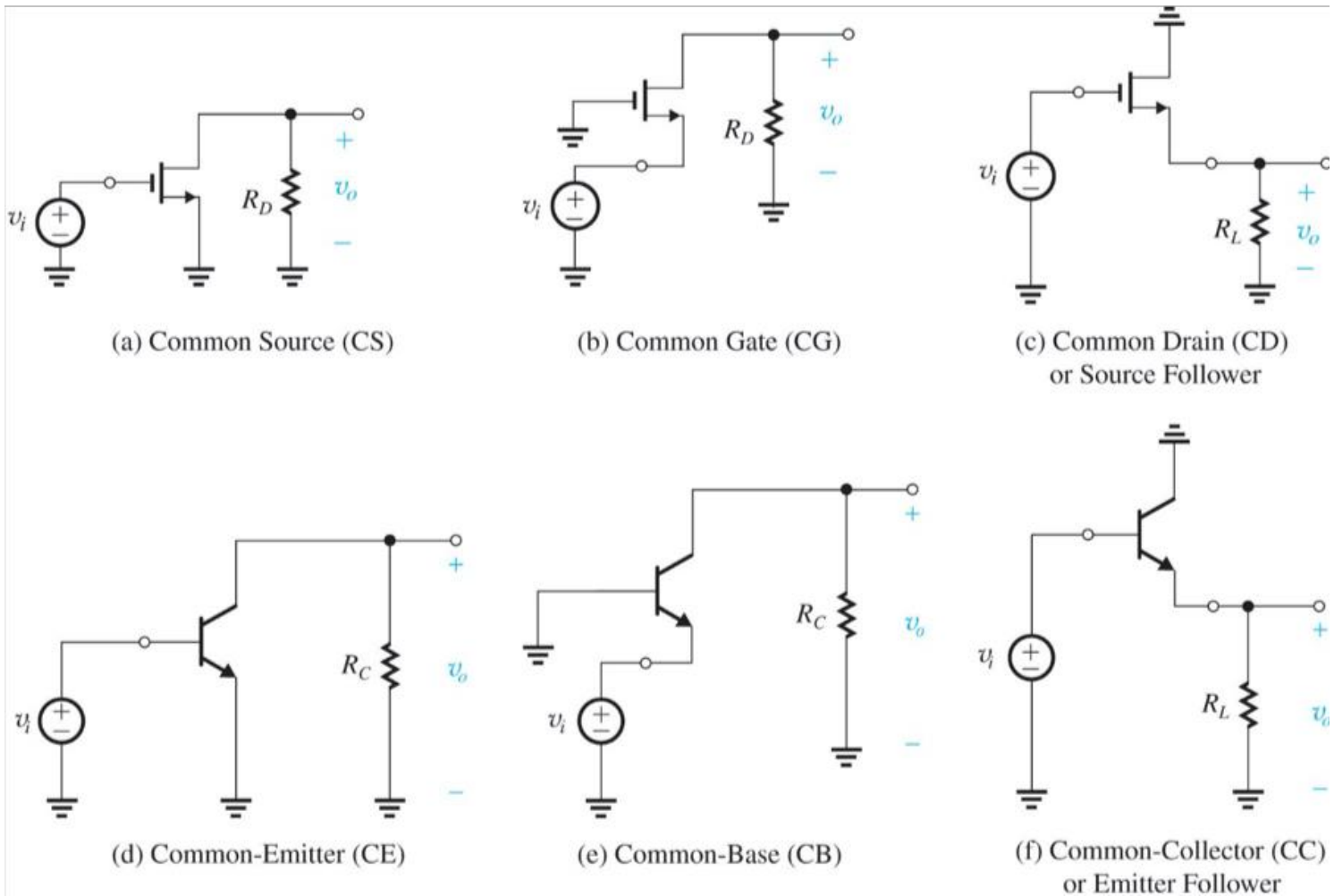
Proc 3



(a) Common Source (CS)

(b) Common Gate (CG)

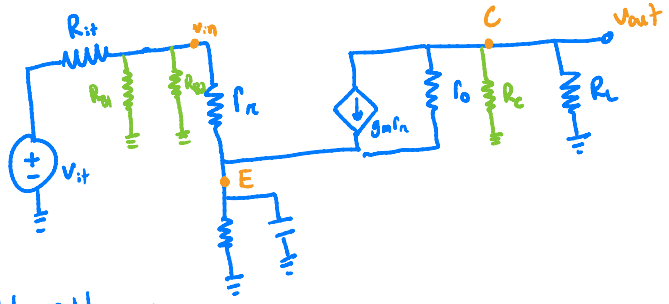
(c) Common Drain (CD) or Source Follower

(d) Common-Emitter (CE)

(e) Common-Base (CB)

(f) Common-Collector (CC) or Emitter Follower

E.1



Petit circuit

① Faire modèle petit signal

AC → Condensateur en CC

→ tension alimentation 0V

② Faire impédance entrée, cela dit que c'est après R_{sit}

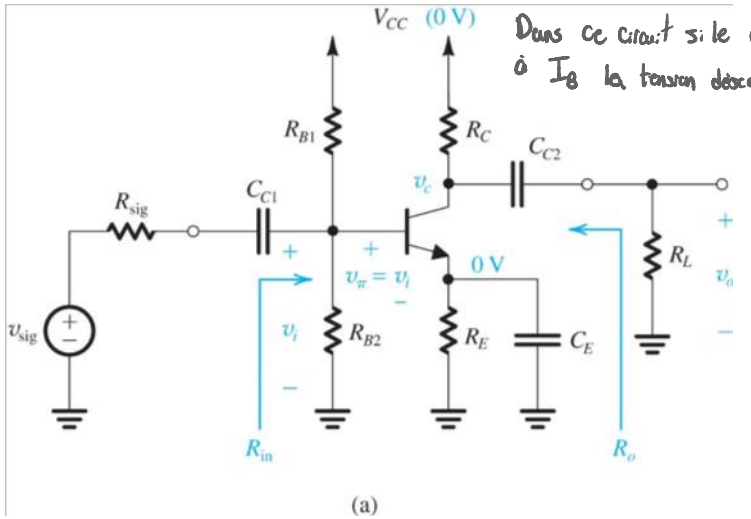
$R_C // R_{B1} // R_{B2} = R_{in}$

③ Faire impédance sortie, cela dit avant load

$R_C // r_o = R_{out}$

④ Trouver gain

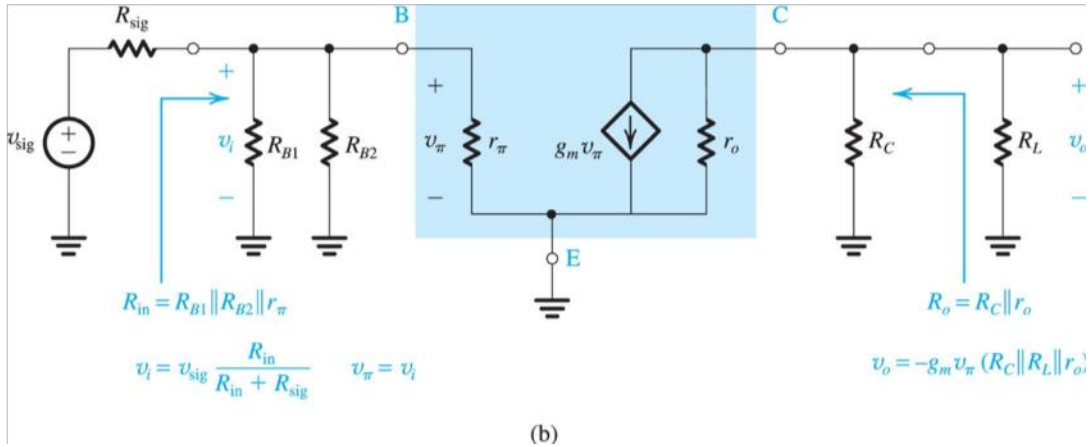
$$V_{out}/V_{in} = \frac{g_m V_\pi \cdot R_{out}}{V_\pi} = g_m R_{out}$$



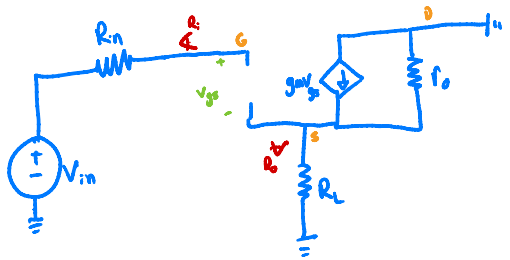
(a)

Dans ce circuit si le courant monte à I_B la tension descends à V_{out}

E.1


R_{sig}
B
C
v_{sig}
v_i
R_{B1}
R_{B2}
v_π
r_π
$g_m v_\pi$
r_o
R_C
R_L
E
$R_{in} = R_{B1} \| R_{B2} \| r_\pi$
$v_i = v_{sig} \frac{R_{in}}{R_{in} + R_{sig}}$
$v_\pi = v_i$
$R_o = R_C \| r_o$
$v_o = -g_m v_\pi (R_C \| R_L \| r_o$
(b)

E.2



$R_{in} = \infty$ il n'a pas d'impédance d'entrée

$R_{out} = r_o // 1/g_m$ on se met devant le R_L

$A_v = \frac{V_o}{V_i} = \frac{g_m V_{gs}(r_o // R_L)}{g_m V_{gs}(r_o // R_L + 1/g_m)}$

$= \frac{r_o // R_L}{R_o // R_L + 1/g_m}$

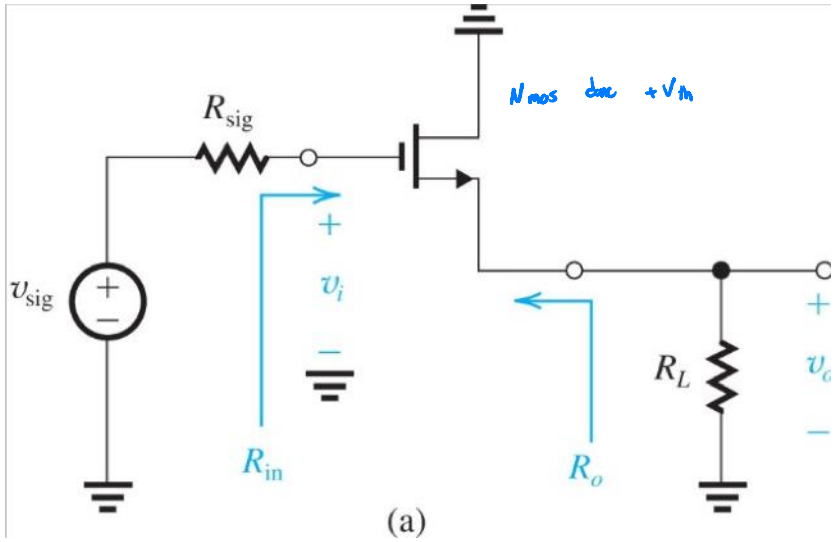
$= \frac{R_L}{R_L + 1/g_m} = \frac{R_L g_m}{R_L g_m + 1} < 1$

On remplace $g_m V_{gs}$ par $1/g_m$

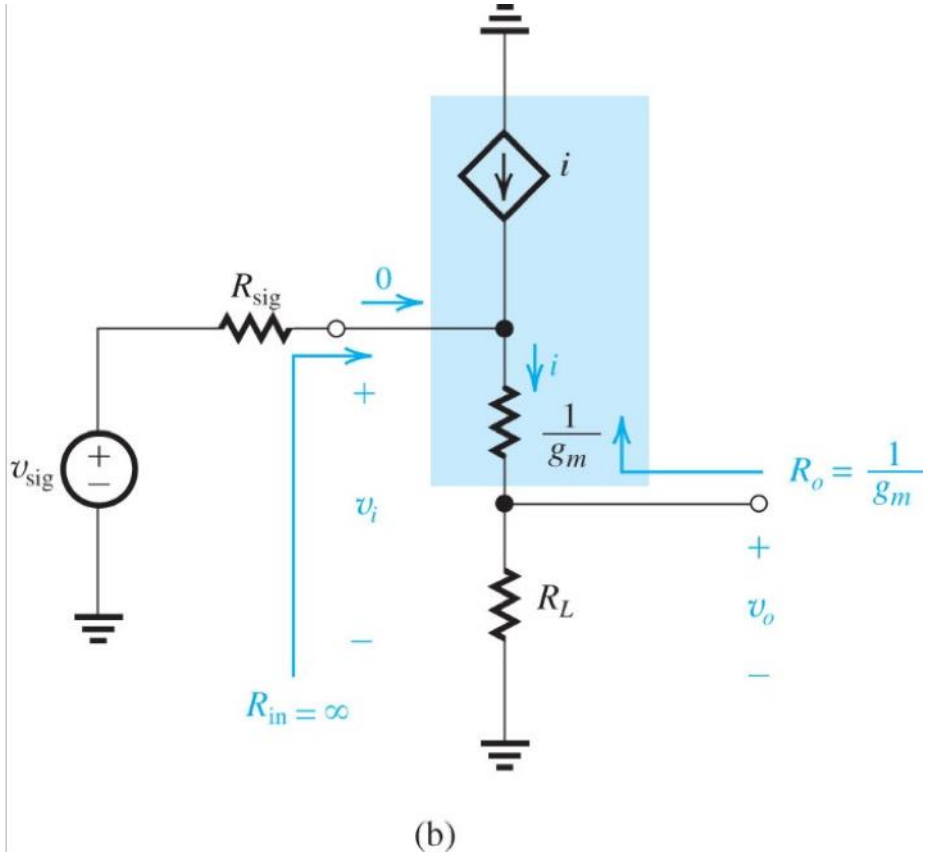
car $\frac{V_s}{g_m V_{gs}} = \frac{V}{I} = R$

$V_s = V_{gs} = 0$

$\frac{V_{gs}}{V_{gs} g_m} = \frac{1}{g_m}$

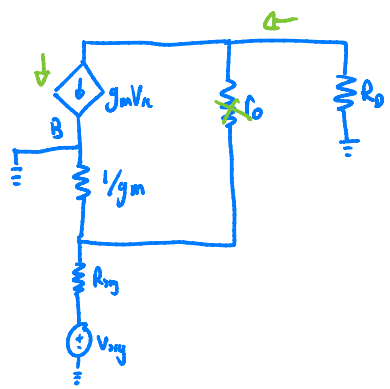


E.2



(b)

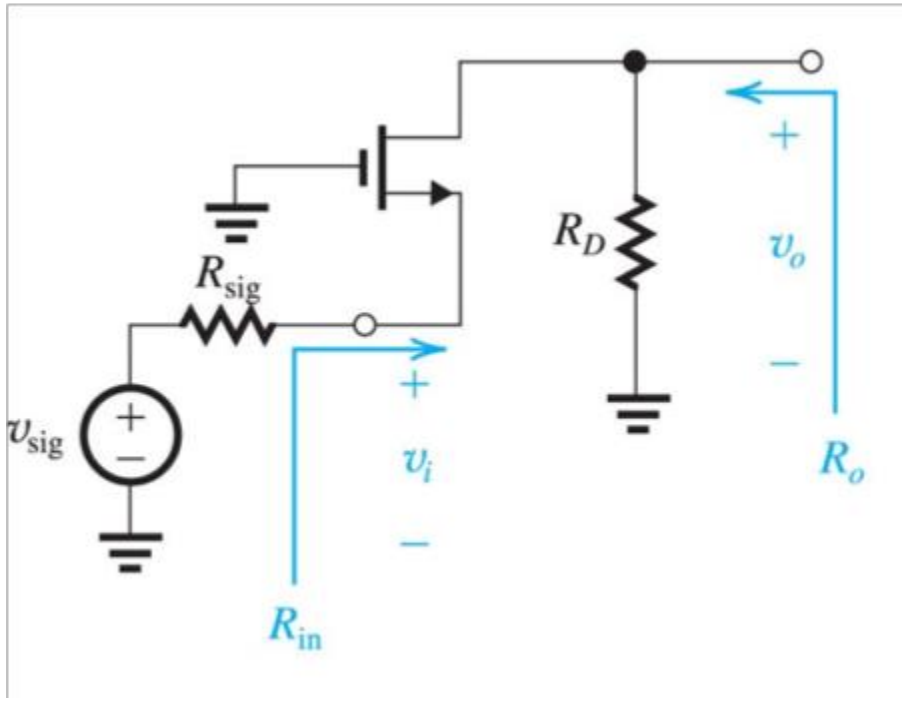
E.3



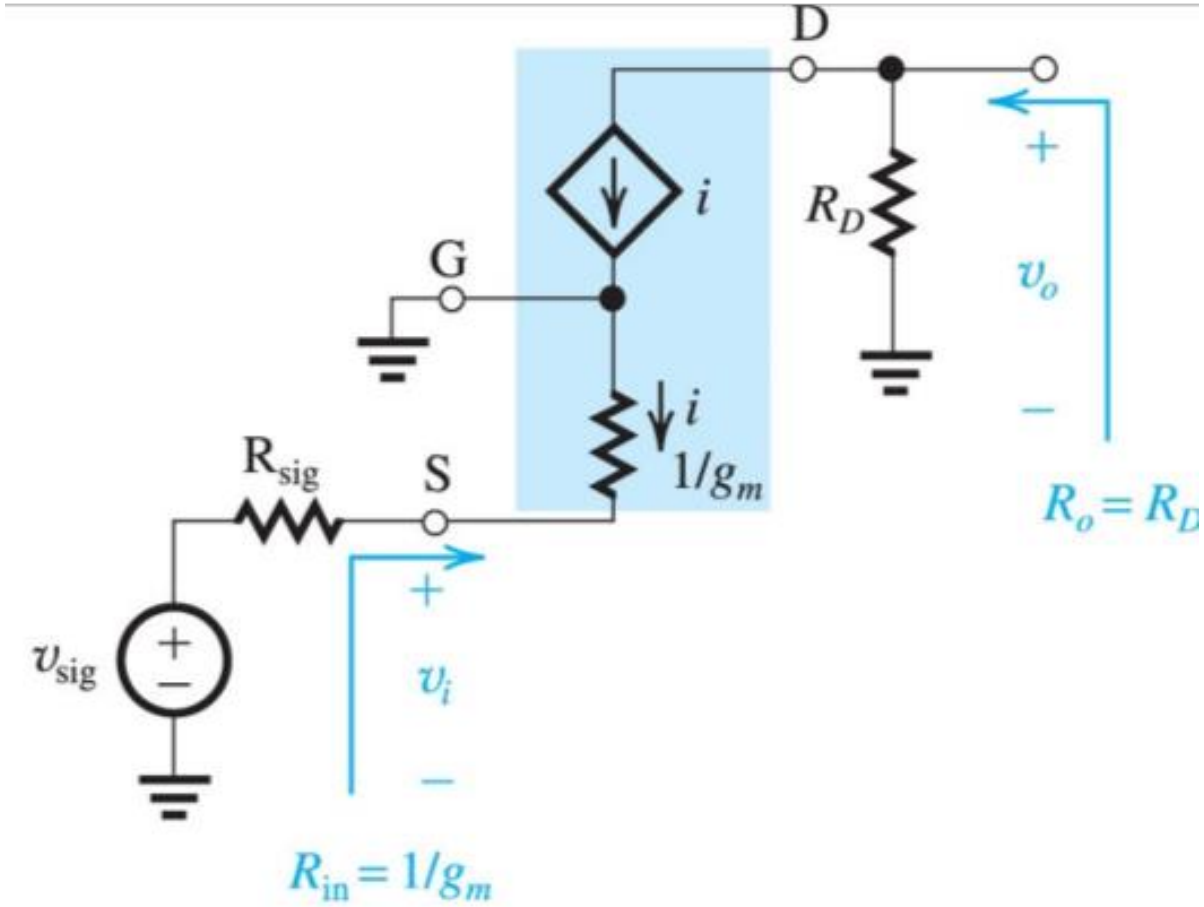
$R_{in} = 1/g_m$ on néglige le r_o

$R_{out} = R_D$

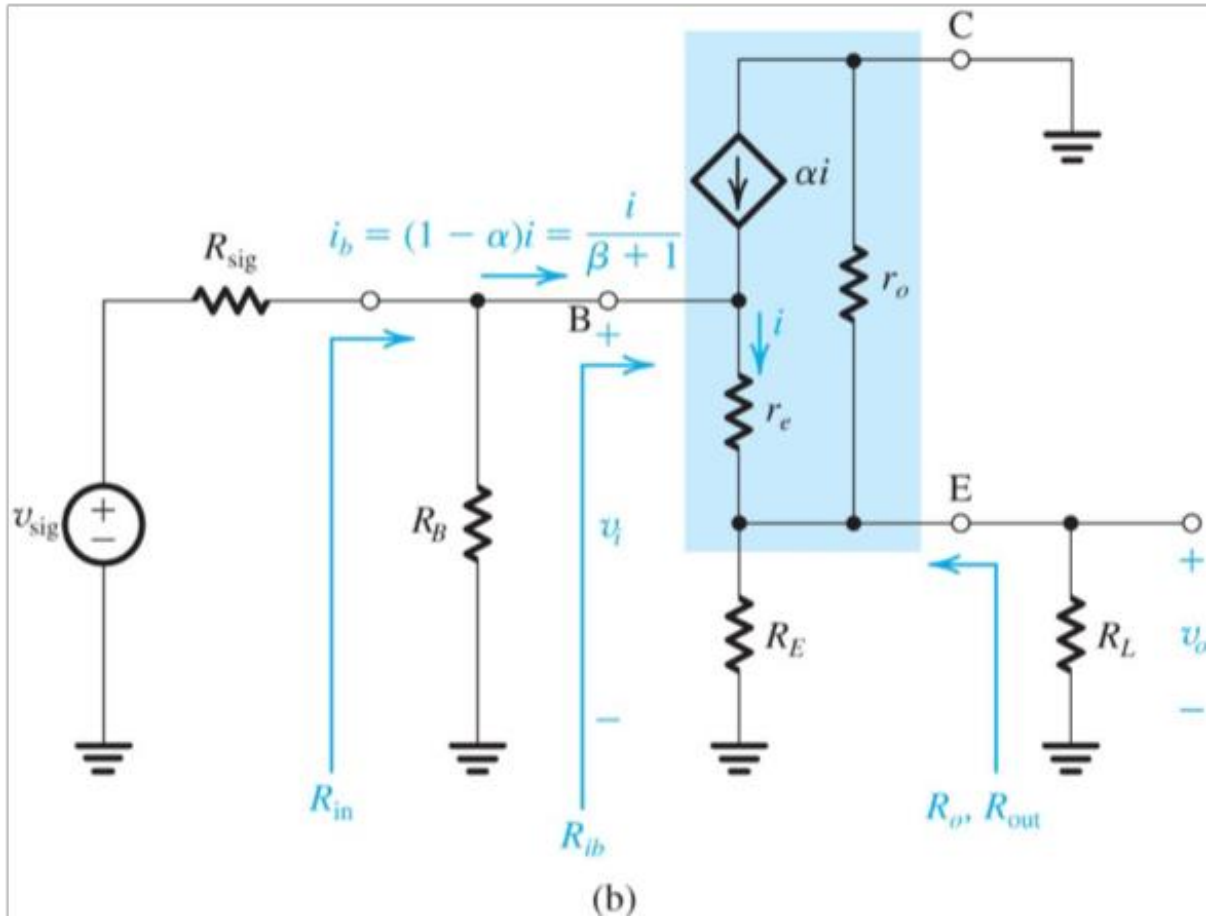
$A_V = \frac{v_o}{v_i} \cdot \frac{-g_m v_{gs} R_D}{-v_{gs}} = g_m R_D$



E.3



E.3

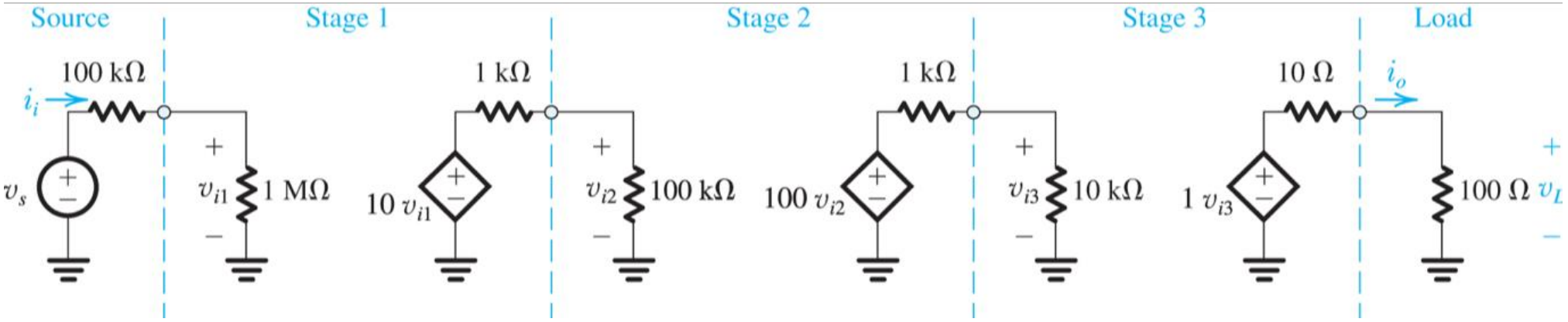

C
αi
$i_b = (1-\alpha)i = \frac{i}{\beta+1}$
R_{sig}
r_o
B
i
r_e
E
v_{sig}
R_B
v_i
R_E
R_L
v_o
R_{in}
R_{ib}
R_o, R_{out}
(b)

E.4

gain tension globale = sans source sans charge

donc

$10 \cdot \frac{100K}{101K} \cdot 100 \cdot \frac{10K}{11K}$



$A_v = \frac{1M}{1.1M} V_s$

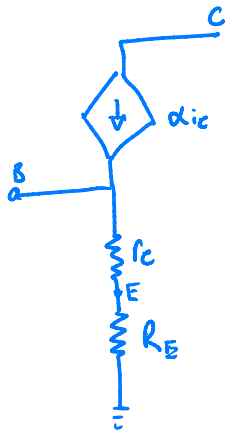
$A_v = 0{,}9090\ v_s$

$10 \cdot 0.9090\ V_s \cdot \frac{100K}{101K} = 9 V_s$ (0,9900)

$100 \cdot 9 V_s \cdot \frac{10K}{11K} = 818.181\ V_s$

$818.181 \cdot \frac{100}{110} = 743.80\ V_s$ (0,9090)

E.5

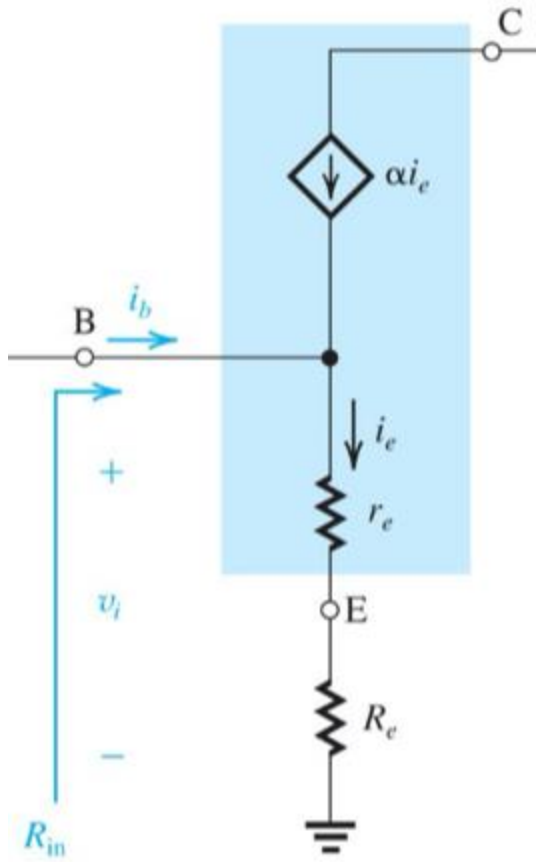


$i_e = i_b + i_c$

$$R_{ib} = \frac{V_i}{i_b} = \frac{i_e(R_E + r_e)}{i_b}$$

$$= \frac{i_b(\beta+1)(R_E+r_e)}{i_b}$$

$$= (\beta+1)(R_E+r_e)$$

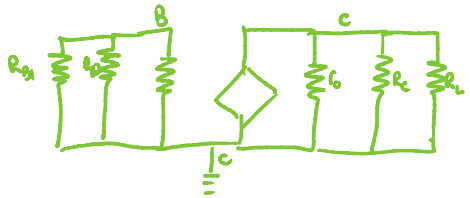


E.6

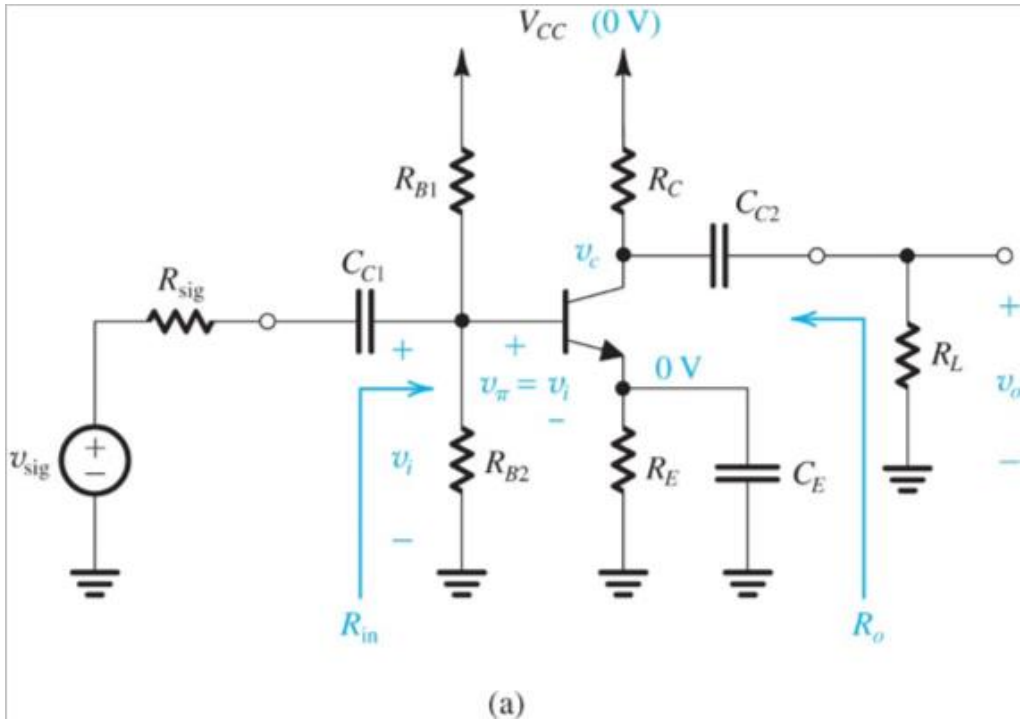
$f_c = \frac{1}{2\pi RC}$

Passe-Bas

Passe haut



Comme si: CC au condensateur

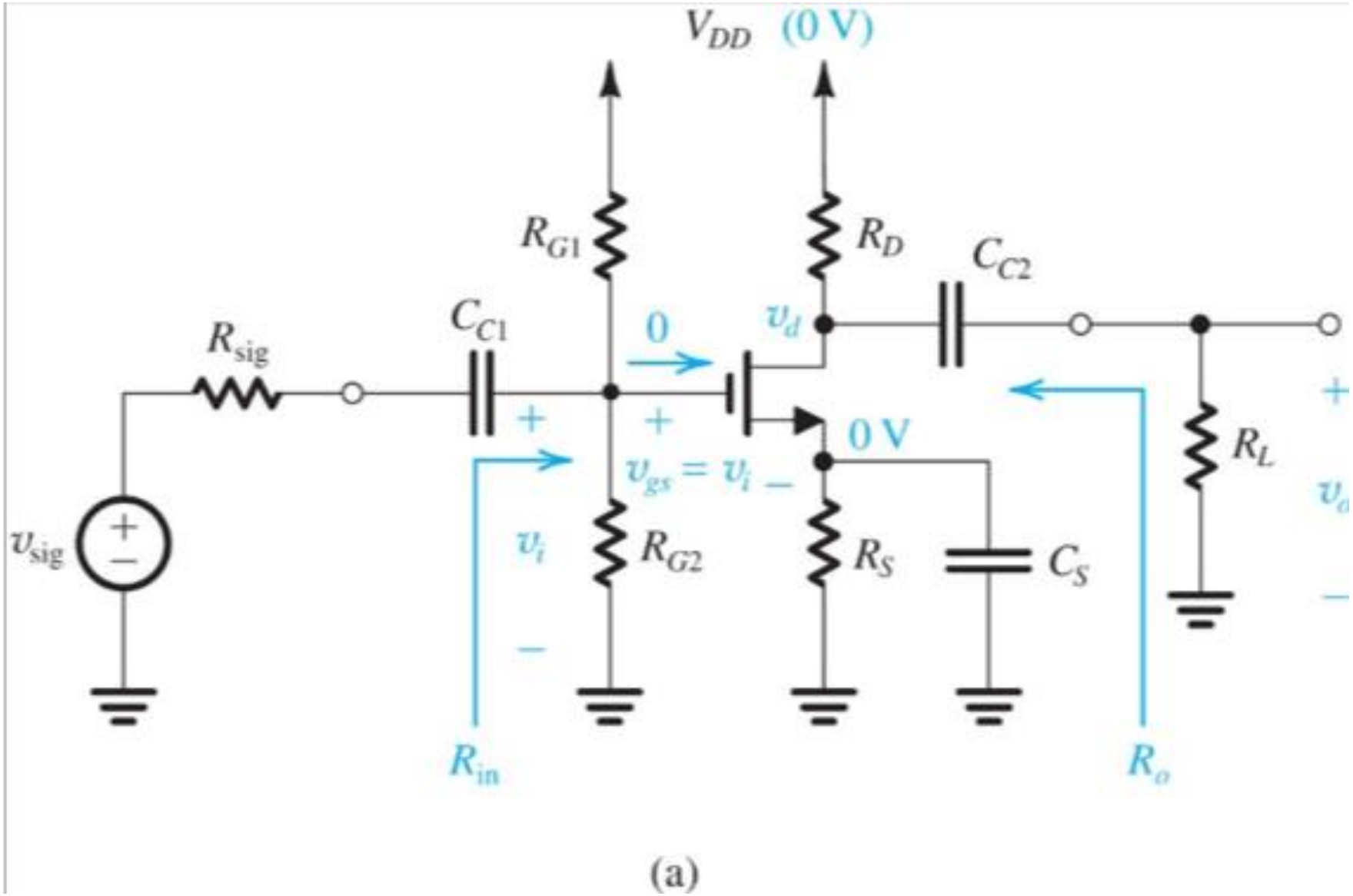


$R_i = R_{B1} // R_{B2} // R_\pi$

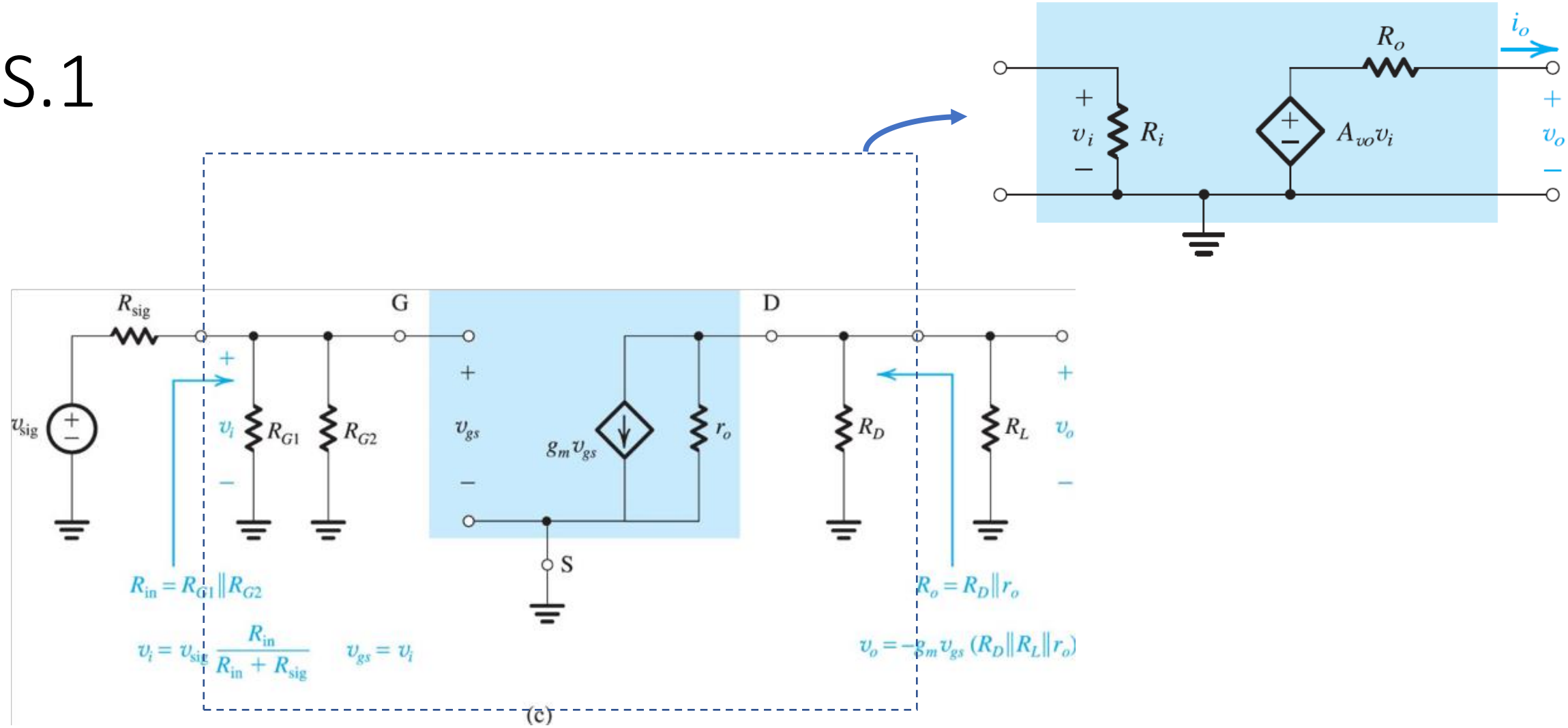
équivalent

Donc $f_c = \frac{1}{2\pi R_{eq} C_{C1}}$

S.1


V_{DD} (0 V)
R_{G1}
R_D
C_{C2}
C_{C1}
R_{sig}
0
v_d
+
$v_{gs} = v_i$ −
0 V
R_L
v_{sig}
v_i
R_{G2}
R_S
C_S
R_{in}
R_o
(a)

S.1


R_o
i_o
v_i
R_i
$A_{vo}v_i$
v_o
R_{sig}
G
D
v_{sig}
v_i
R_{G1}
R_{G2}
v_{gs}
$g_m v_{gs}$
r_o
R_D
R_L
v_o
S
$R_{in} = R_{G1} \| R_{G2}$
$R_o = R_D \| r_o$
$v_i = v_{sig} \frac{R_{in}}{R_{in} + R_{sig}}$
$v_{gs} = v_i$
$v_o = -g_m v_{gs} (R_D \| R_L \| r_o)$
(c)

S.2