BJT Amplifier
Common Base Amp (H.13)

20170630

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References

Based

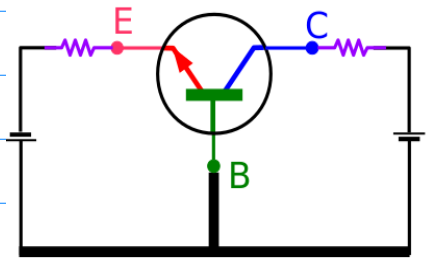
[1] Floyd, Electronic Devices 7th ed
[2] Cook,

[2] en.wikipedia.org

	Common Base	Common Emitter	Common Collector
Z_{in}	CB : low $r_e \| \| R_E \approx r_e$	CE : med $R_1 \| \| R_2 \| \| \beta r_e$	CC : high $R_1 \| \| R_2 \| \| \beta(r_e + R_E)$
Z_{out}	CB : high R_C	CE : med R_C	CC : low $(r_e + \frac{R_s}{\beta}) \| \| R_E = \frac{R_s}{\beta} \| \| R_E$
A_v	CB : high $\frac{R_C}{r_e}, \frac{R_C \| \| R_L}{r_e}$	CE : med $\frac{R_C}{r_e}, \frac{R_C \| \| R_L}{r_e}$	CC : unity $\frac{R_E}{(r_e + R_E)} \approx 1$
A_i	CB : unity	CE : med	CC : high

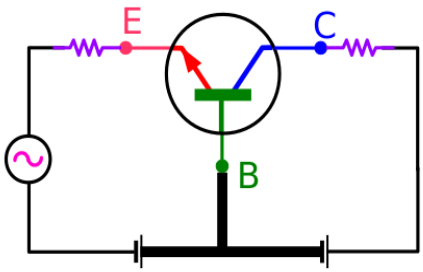
VDB

Common Base Configuration



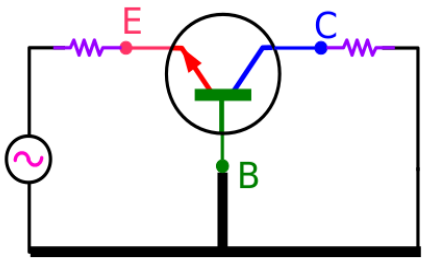
Common Base

DC Bias



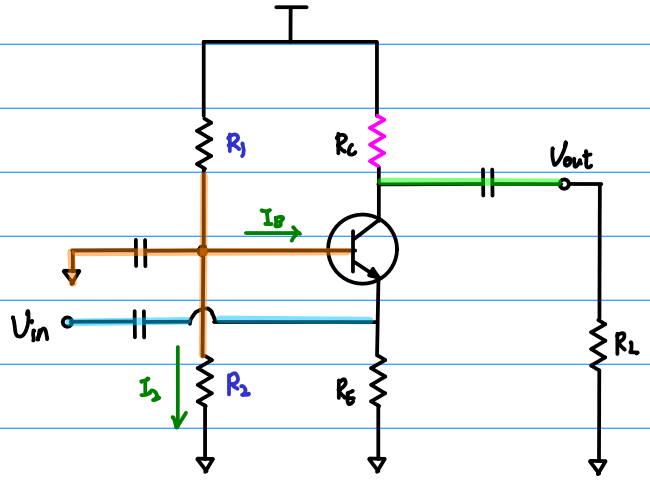
Common Base

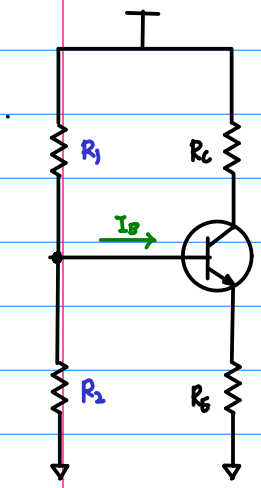
DC Bias + AC Signal

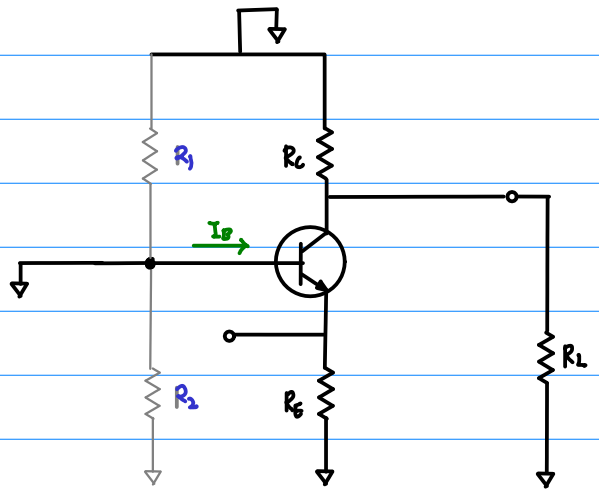


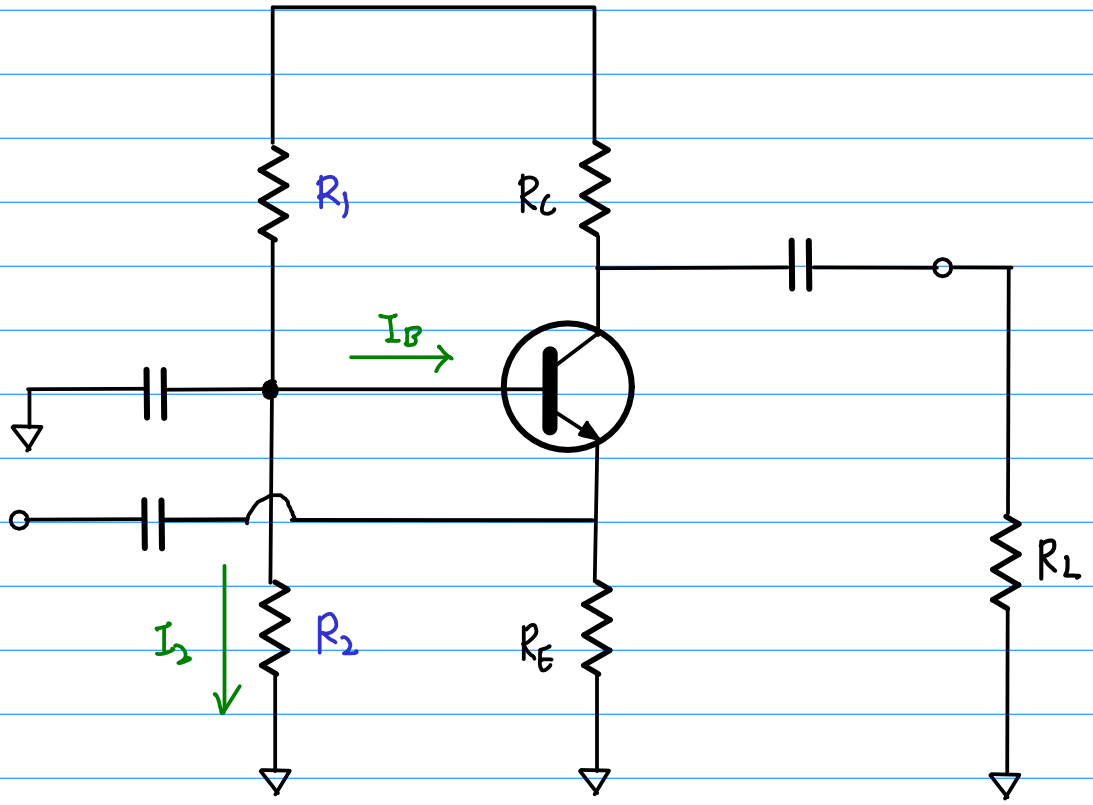
Common Base

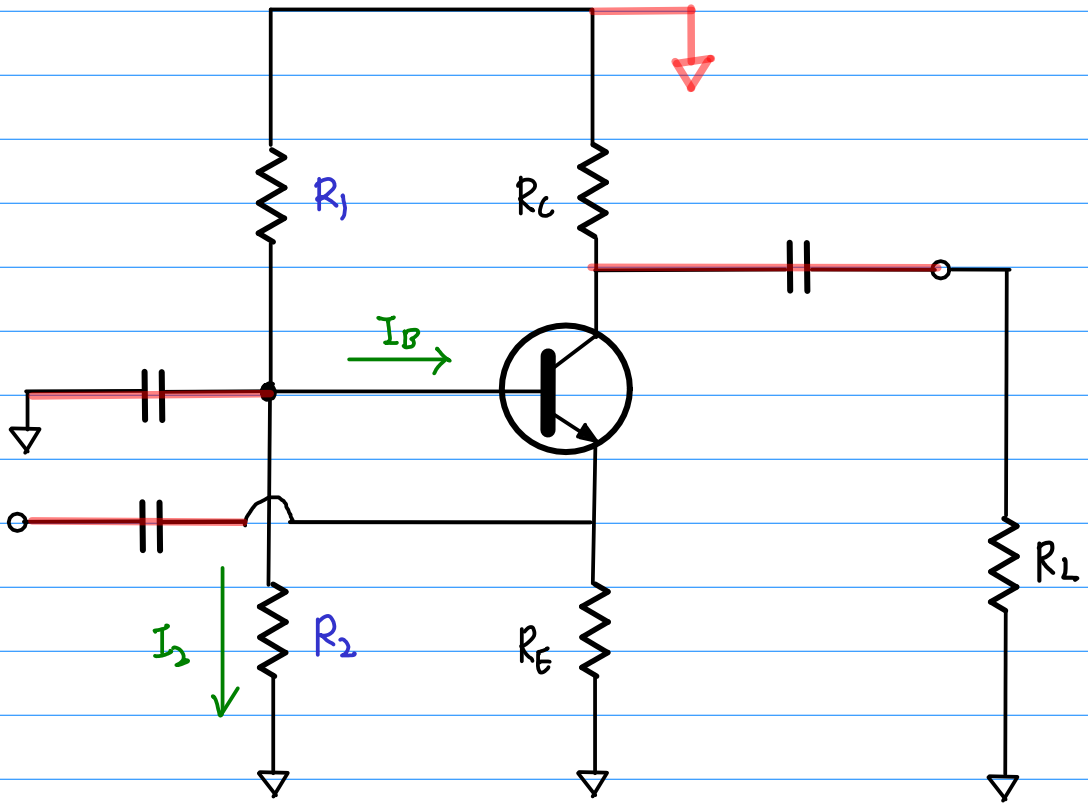
AC Signal

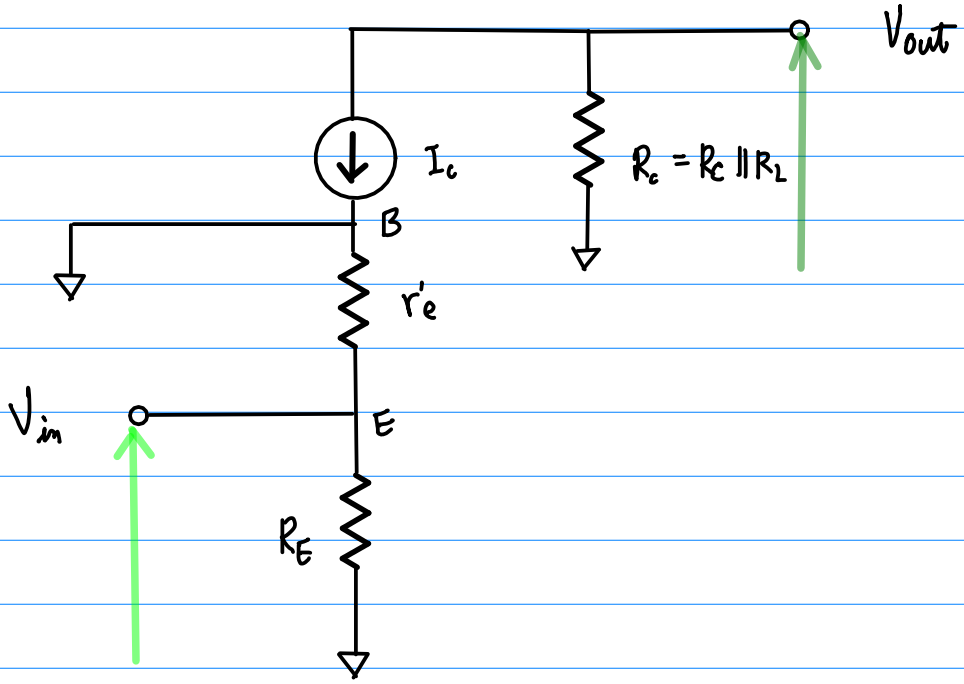







R_1
R_C
I_B
I_2
R_2
R_E
R_L


R_1
R_C
I_B
R_L
I_2
R_2
R_E


V_{out}
I_c
$R_c = R_C \parallel R_L$
B
r'_e
V_{in}
E
R_E

$$A_V = \frac{V_{out}}{V_{in}} = \frac{V_c}{V_e} = \frac{I_c R_C}{I_e (r_e' \| R_e)} \cong \frac{I_e R_C}{I_e (r_e' \| R_e)}$$

$R_E \gg r_e'$

$$A_V = \frac{R_c}{r_e'} \qquad R_c = R_C \| R_L$$

$$R_{in(emitter)} = \frac{V_{in}}{I_{sn.}} = \frac{V_e}{I_e} = \frac{I_e (r_e' \| R_E)}{I_e}$$

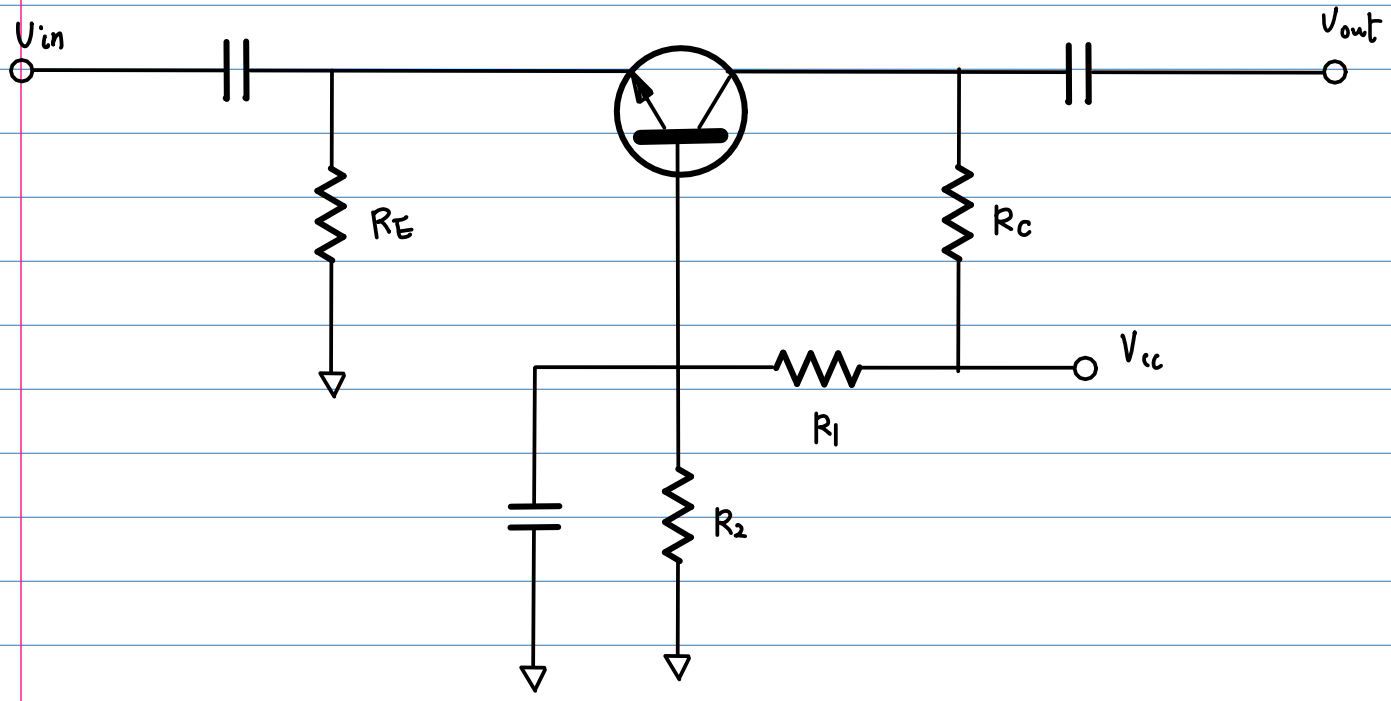
$R_E \gg r_e'$

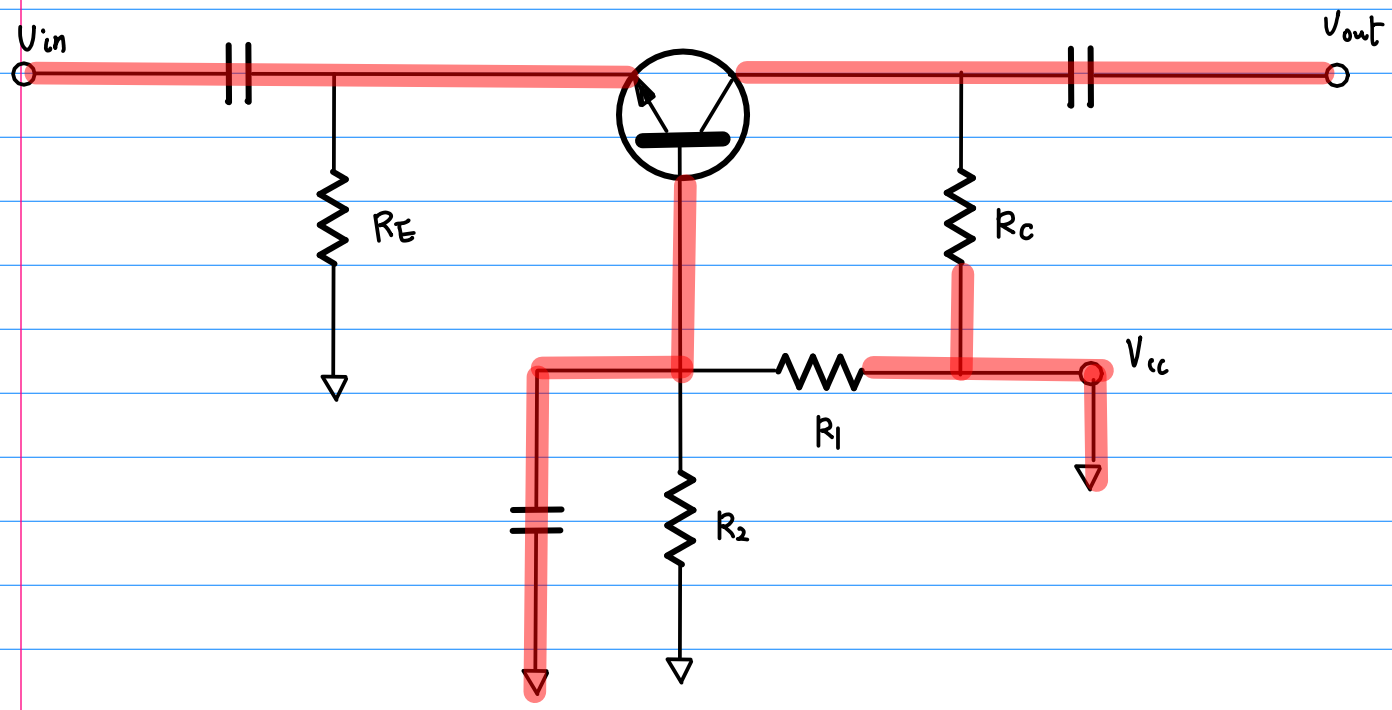
$R_{in(emitter)} \cong r_e'$

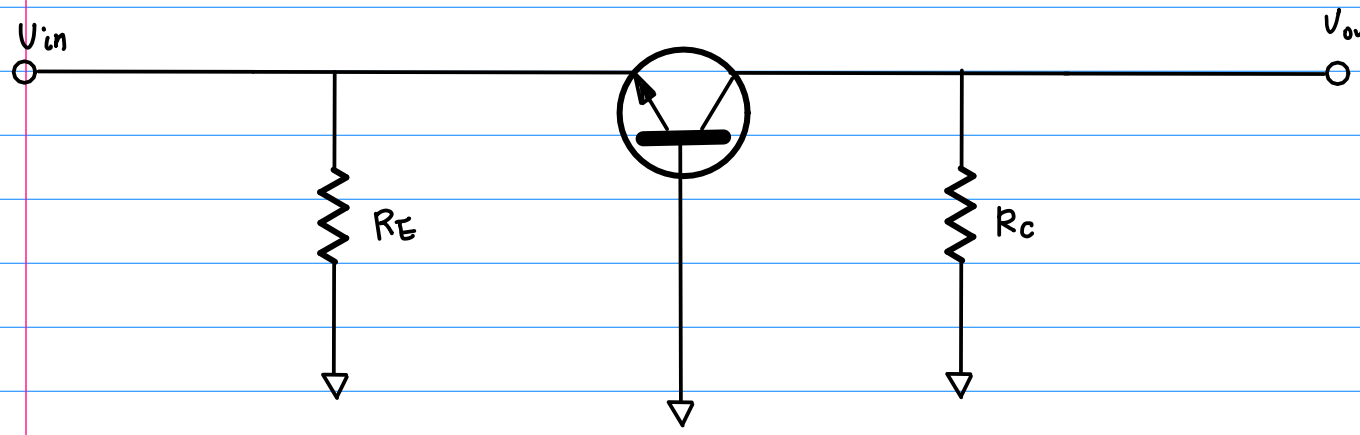
$R_{out} \cong R_C \qquad r_C' \| R_C \qquad r_C' \gg R_C$

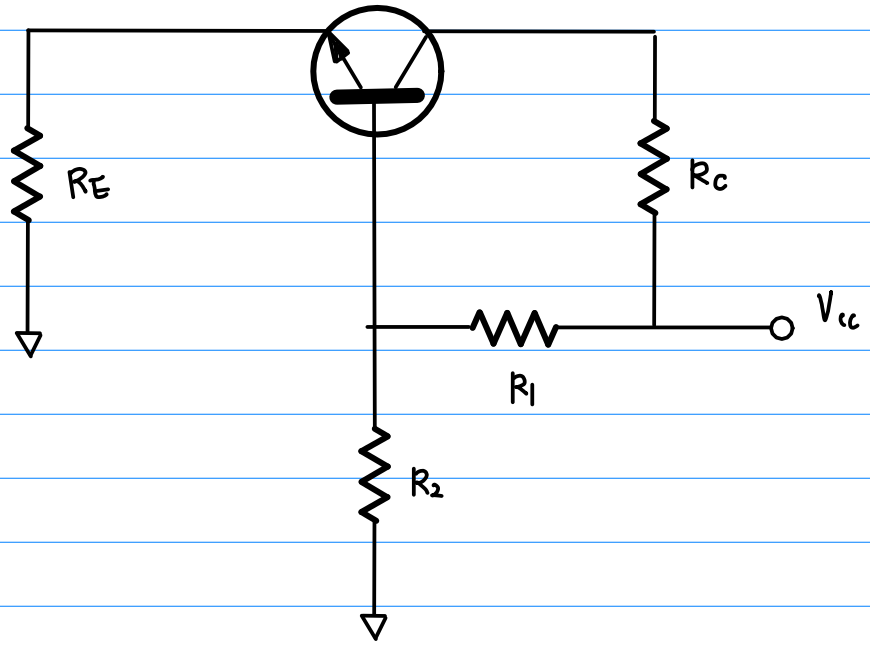
$I_c \cong I_e$

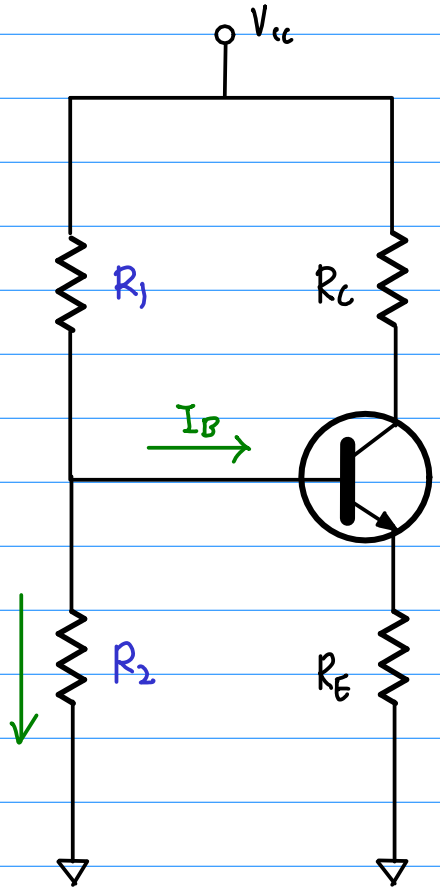
$A_i = 1$


Vin
Vout
RE
RC
Vcc
R1
R2


Vin
Vout
RE
RC
R1
Vcc
R2


Vin
Vout
RE
RC


R_E
R_C
V_{cc}
R_1
R_2


V_{cc}
R_1
R_C
I_B
R_2
R_E