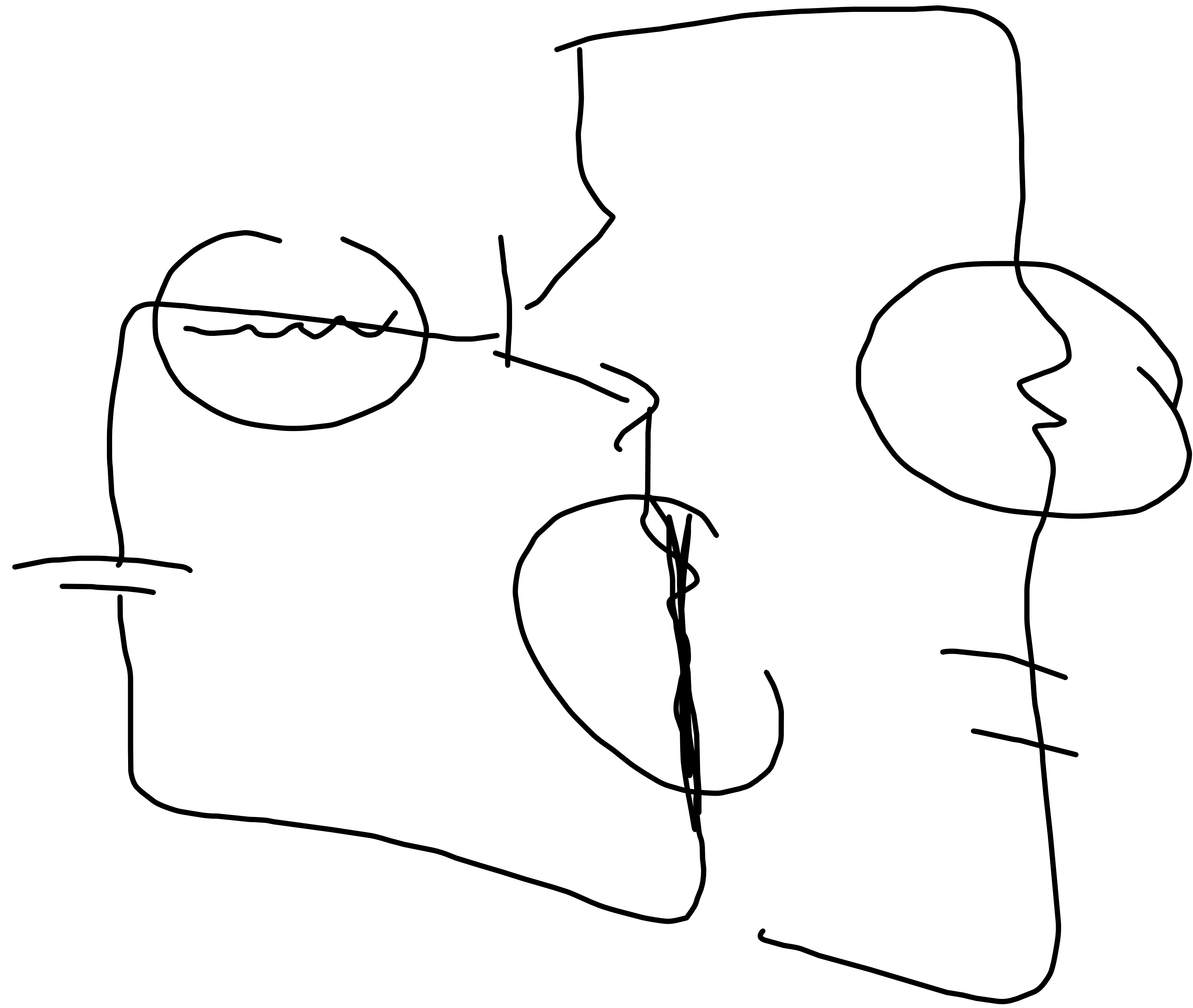
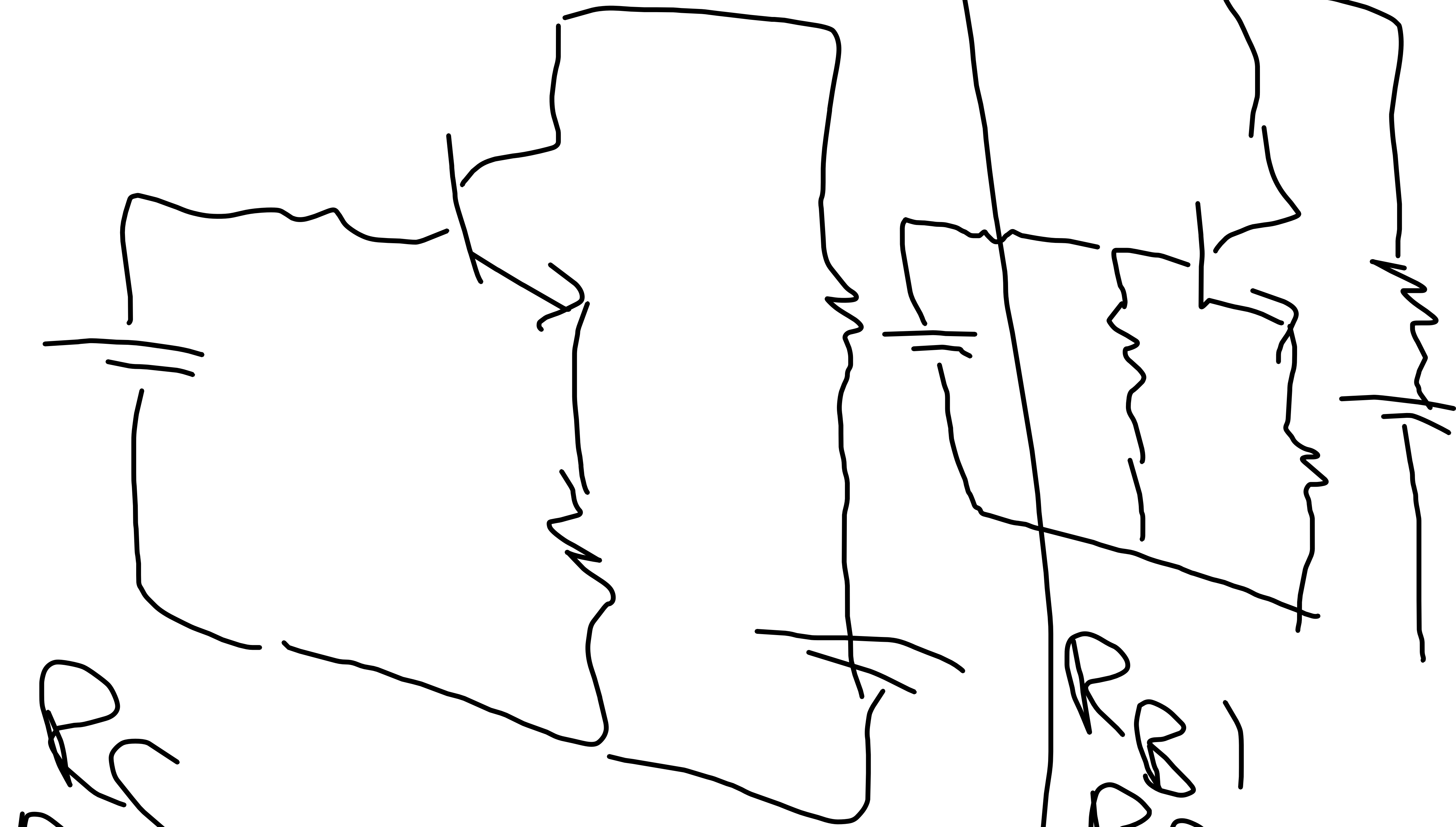


Fixed-bias



V_{CC}
 R_B
 R_C
 R_E

Emitter bias

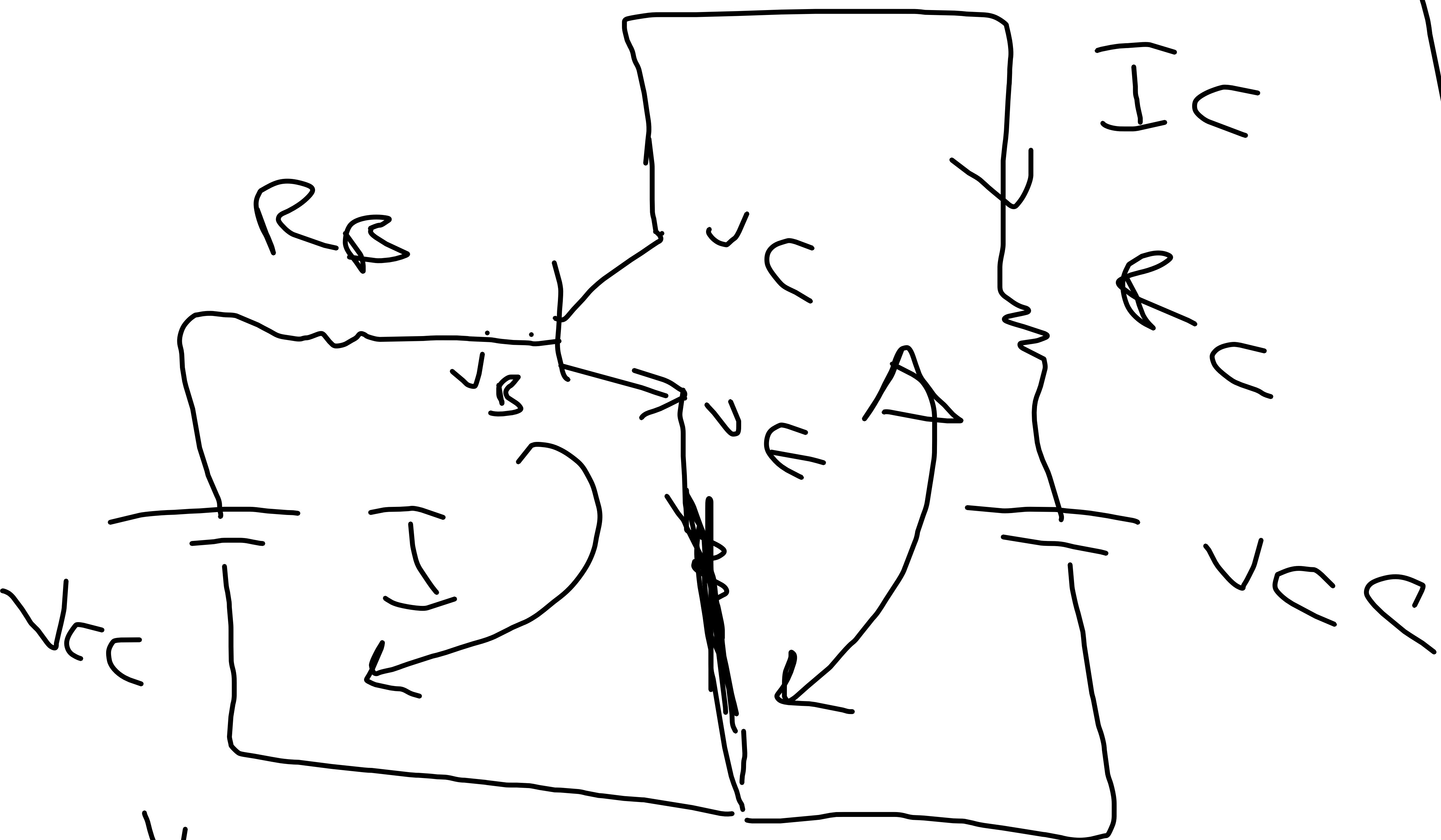


V_{CC}
 R_B
 R_C
 R_E

V_{CC}
 R_B
 R_C
 R_E

V_{CC}
 R_B
 R_C
 R_E

Fixed bias



V_{BE}
 V_{CE}
 V_{CB}

KVL mesh 1

$$-V_{CC} + I_B R_B + V_{BE} = 0$$

$$I_B = \frac{V_{CC} - V_{BE}}{R_B}$$

KVL mesh 2

$$I_C = \beta I_B$$

$$-V_{CC} + I_C R_C + V_{CE} = 0$$

$$V_{CE} = V_{CC} - I_C R_C$$

$$-V_{CC} + I_C R_C + V_{CE} + I_E R_E = 0$$

$$-V_{CC} + I_C R_C + V_{CE} + I_E R_E = 0$$



$$-V_{CC} + I_B R_B + V_{BE} + (B+1) I_B R_E = 0$$

$$I_B R_B + (B+1) I_B R_E = V_{CC} - V_{BE}$$

$$I_B = \frac{V_{CC} - V_{BE}}{R_B + (B+1) R_E}$$

KVL mesh 1

$$-V_{CC} + I_B R_B + V_{BE} + I_E R_E = 0$$

$$I_E = (B+1) I_B$$

$$I_E = (B+1) I_B$$

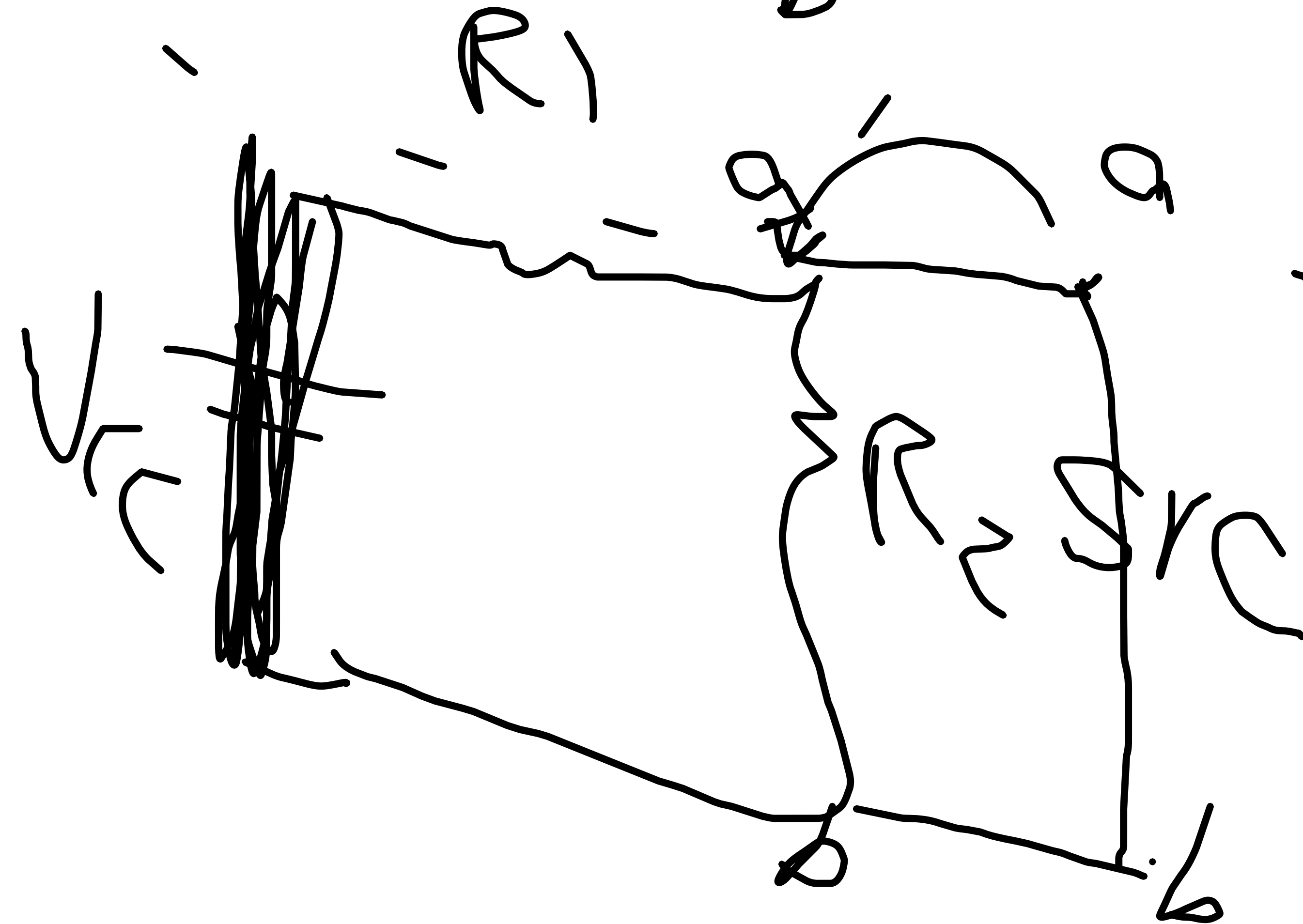
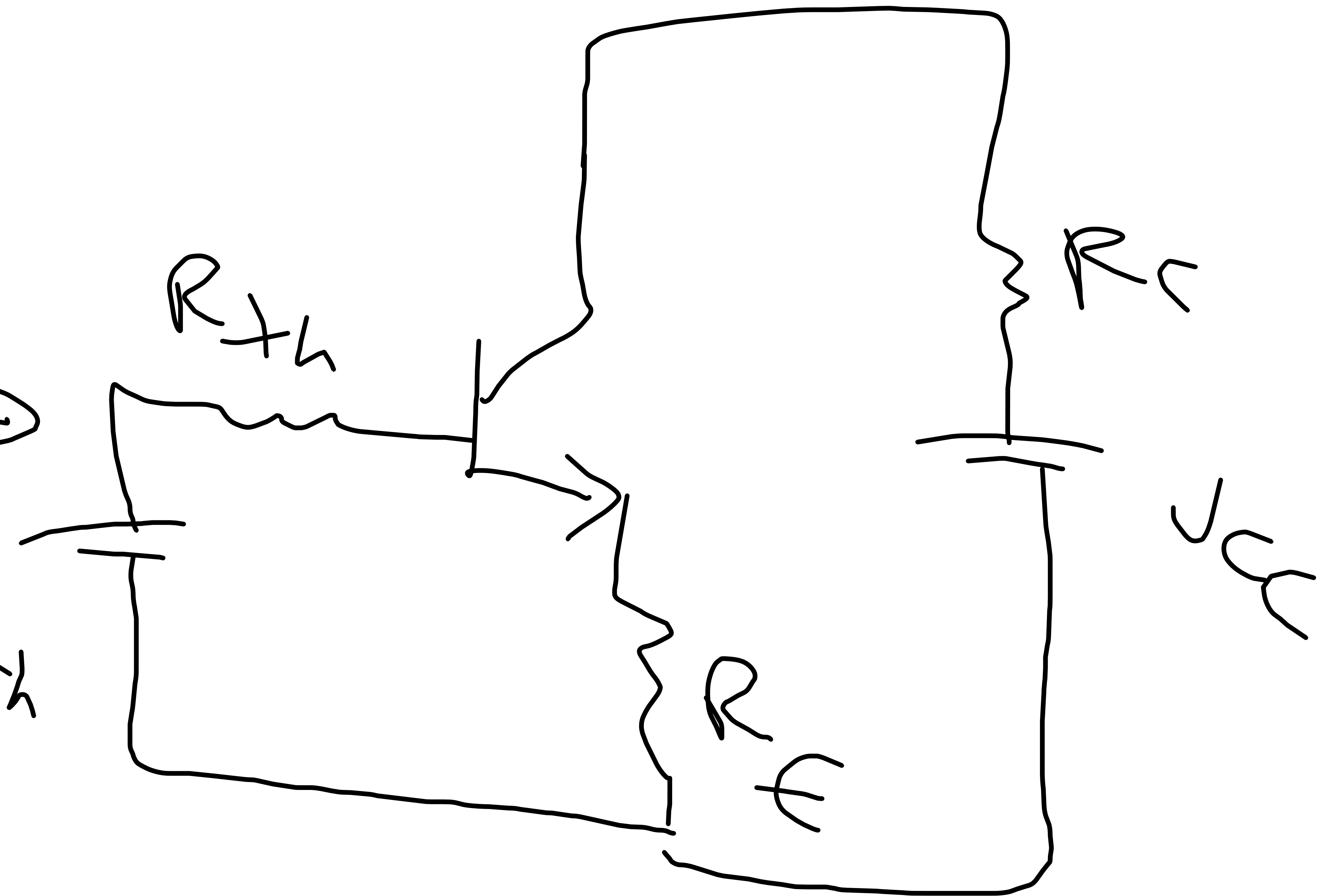
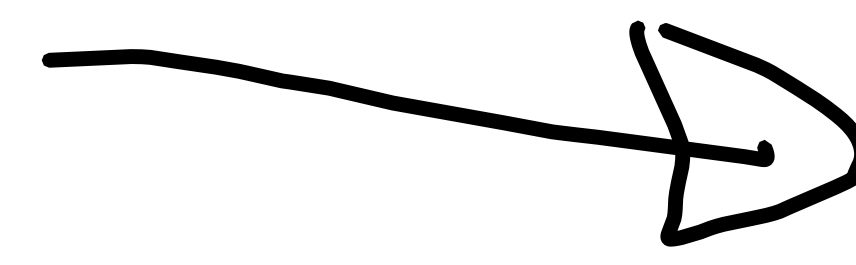
$$I_E = (B+1) I_B$$

$$I_E = (B+1) I_B$$

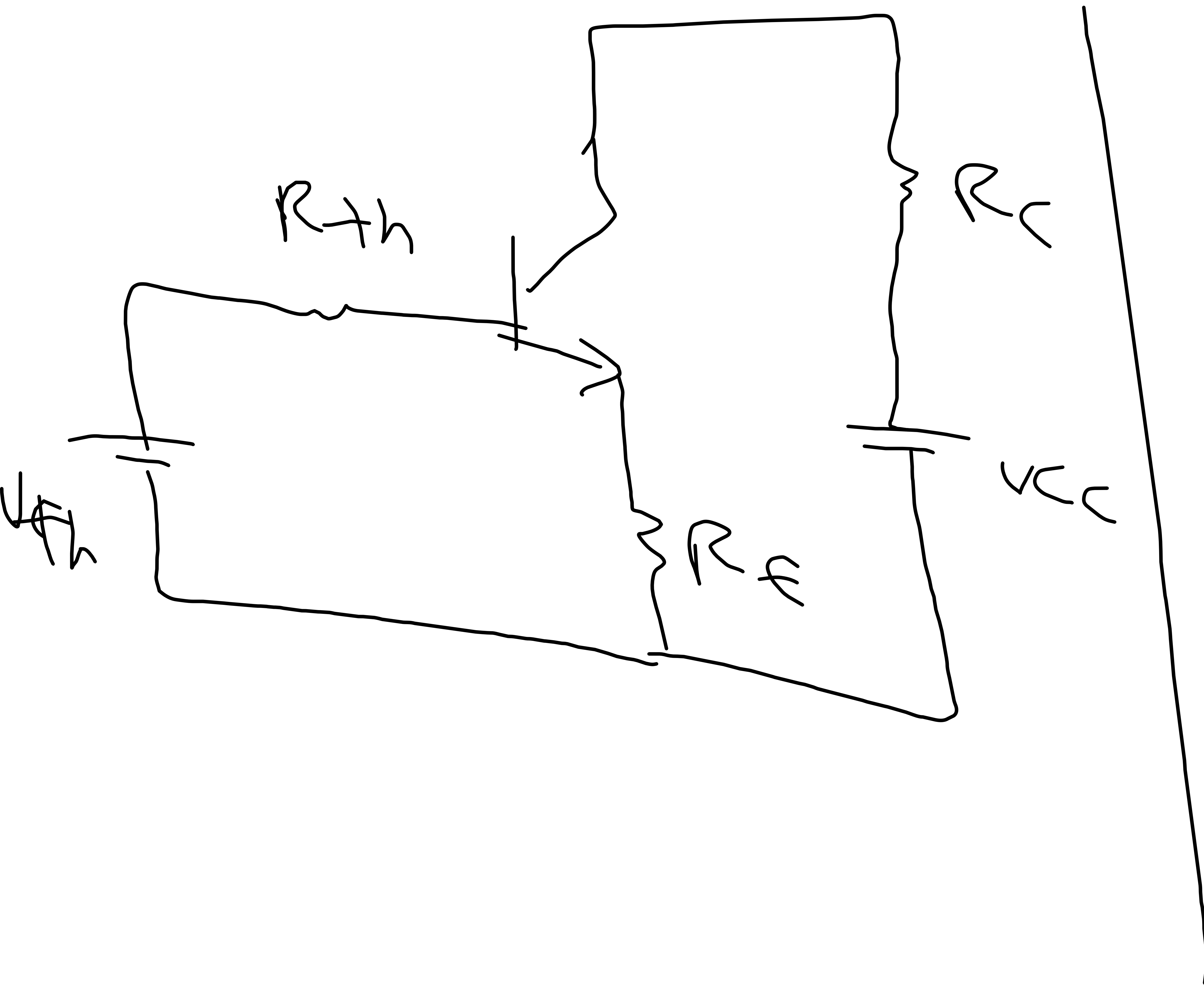
$$I_E = (B+1) I_B$$

V_{cc} 1702 Divider

Emitter bias



$$V_{th} = V_{a_b} = V_{cc} \times \frac{R_2}{R_1 + R_2} \quad \bigg| \quad R_{th} = R_1 \parallel R_2$$



$$I_B = \frac{V_{th} - V_{BE}}{R_{th} + (\beta + 1)R_E}$$

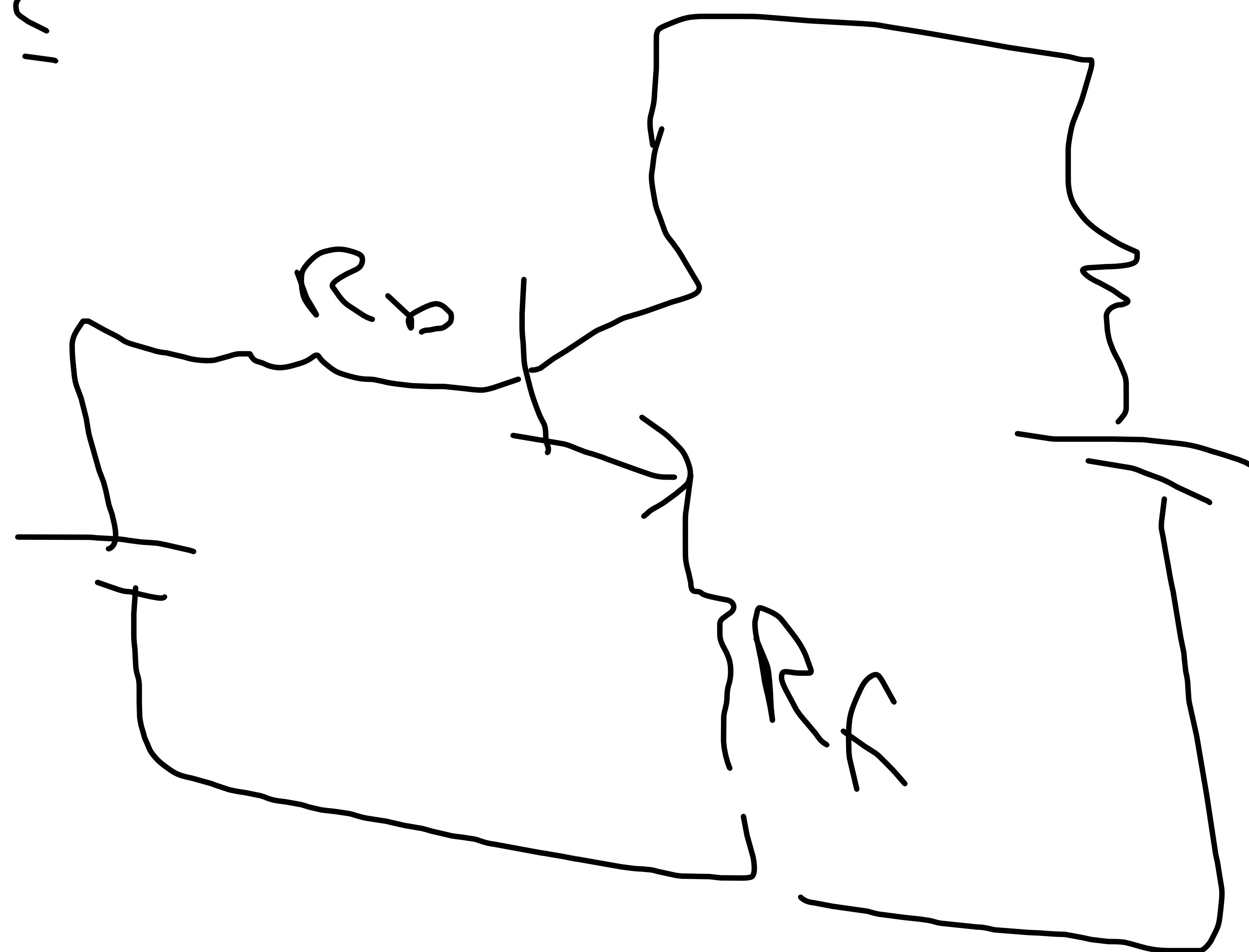
$$V_{CE} = \frac{V_{CC} - I_C(R_E + R_C)}$$

* Derive the eqn

① I_B ? of fixed bias

② I_C ?

*
||



V_C
||

V_E
||

|| R_C ||

||

+ transistor



logic
gate

~~Fixed~~

$I_B =$	$I_B =$	$I_B =$
$V_{CE} =$	$V_{CE} =$	$V_{CE} =$

logic gates

NOT

A	NOT A
0	1
1	0

AND

A	B	A AND B
0	0	0
1	0	0
0	1	0
1	1	1

Computer

↓
Devices

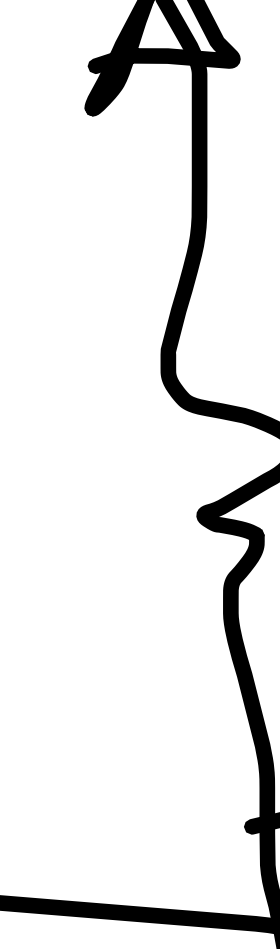
↓
Chips

↓
Logic Gate

Trans

↓
Dial

$V_{CC} = 5$



v_{out}

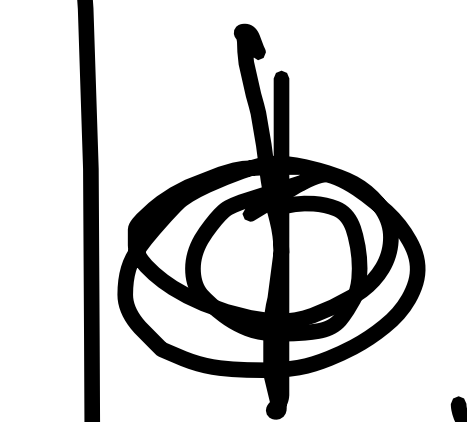
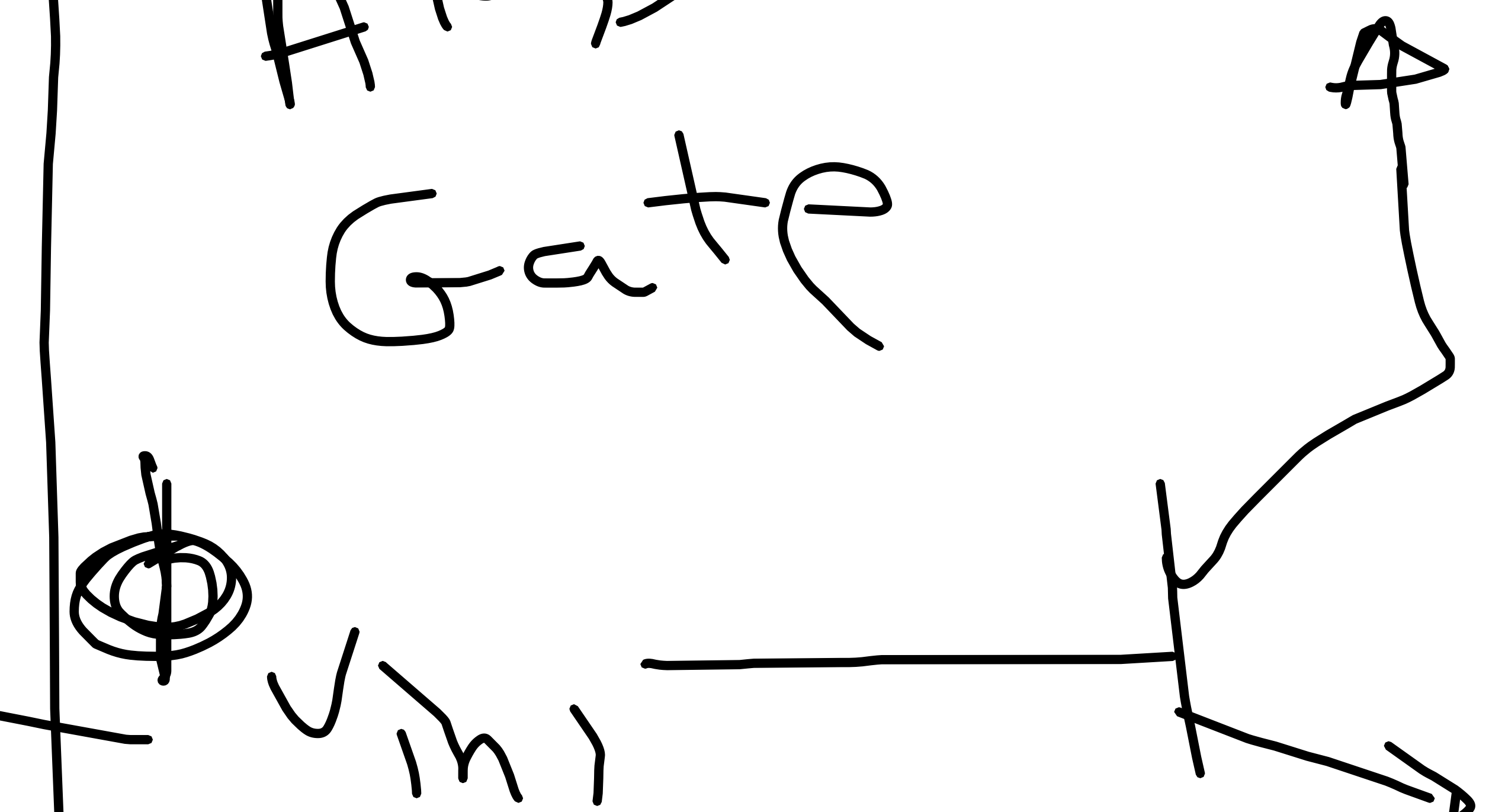
0.7

Not

v_{in}	v_{out}
0	1
1	0

AND Gate

$V_{CC} = 5$



v_{in1}



v_{in2}

v_{in1}	v_{in2}	v_{out}
0	0	0
0	1	0
1	0	0
1	1	1

v_{out}

$V_{CC} = 5$

AND Gate

$V_{CC} = 5$

v_{out}

v_{in1}

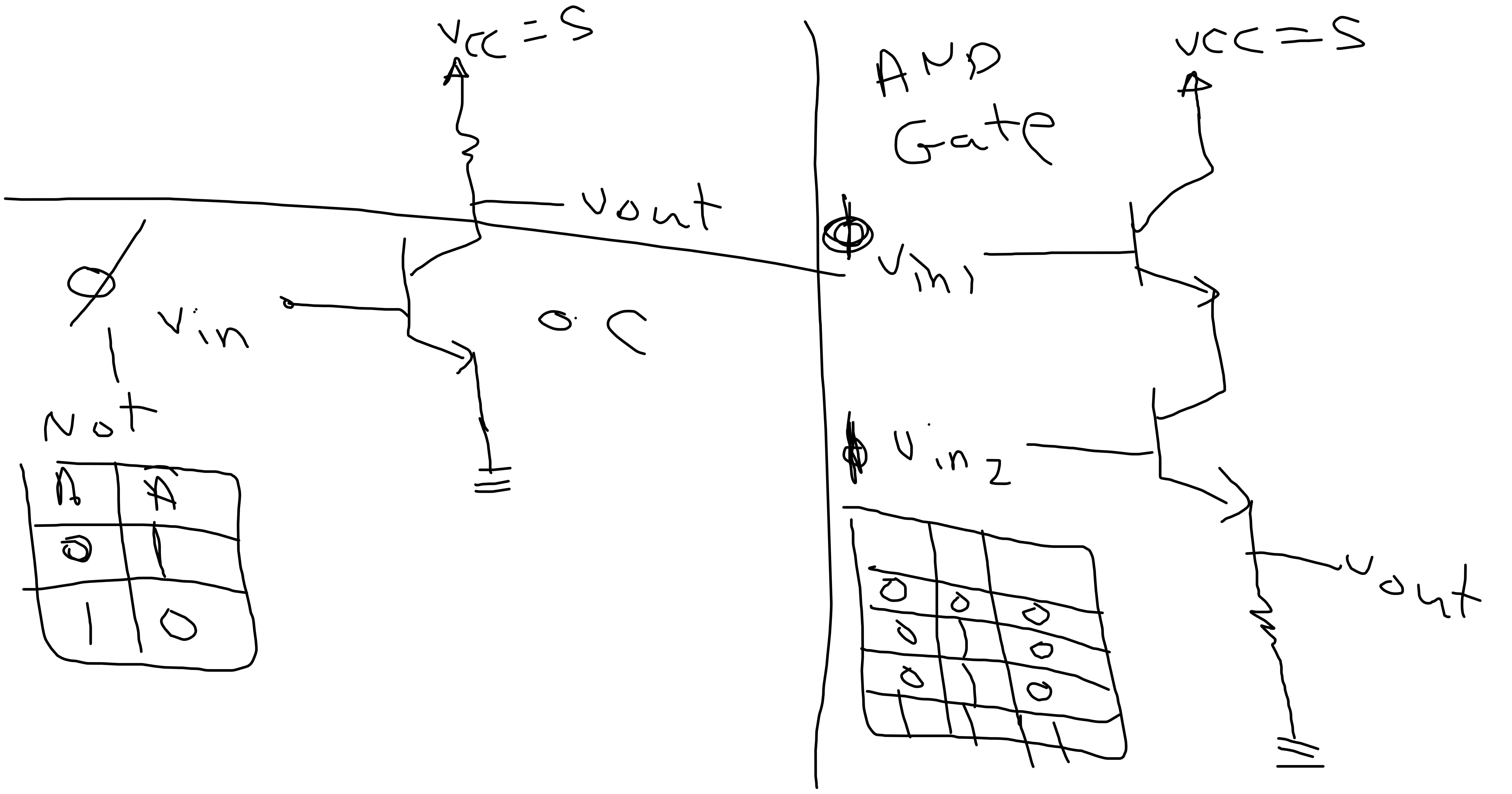
Not

v_{in}	v_{out}
0	1
1	0

v_{in2}

v_{in1}	v_{in2}	v_{out}
0	0	0
0	1	0
1	0	0
1	1	1

v_{out}



A	B	
0	0	1
0	1	1
1	0	1
1	1	0

$V_{CC} = 5$

0	0	0
0	1	1
1	0	1
1	1	1

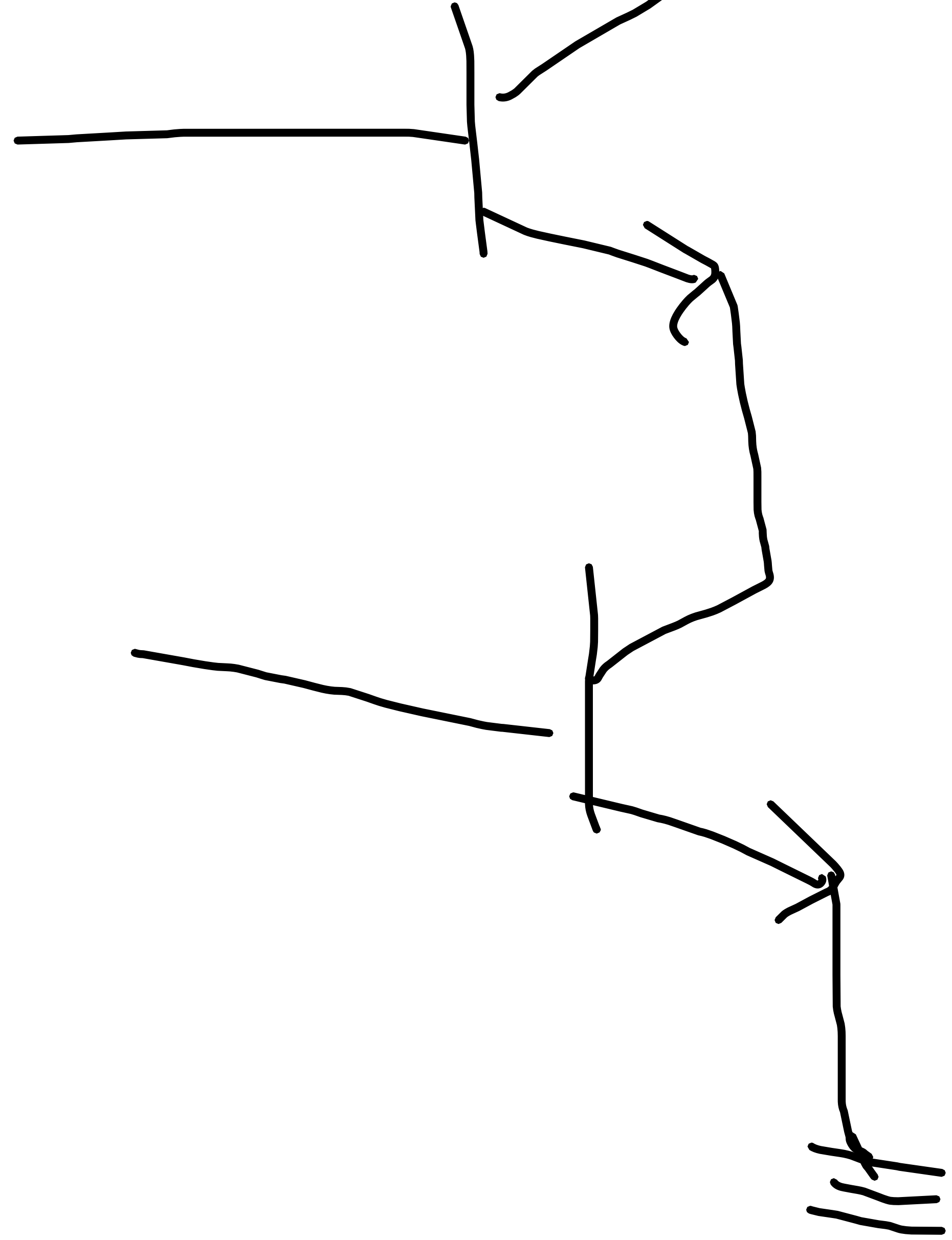
V_{in}

$V_{CC} = 5$

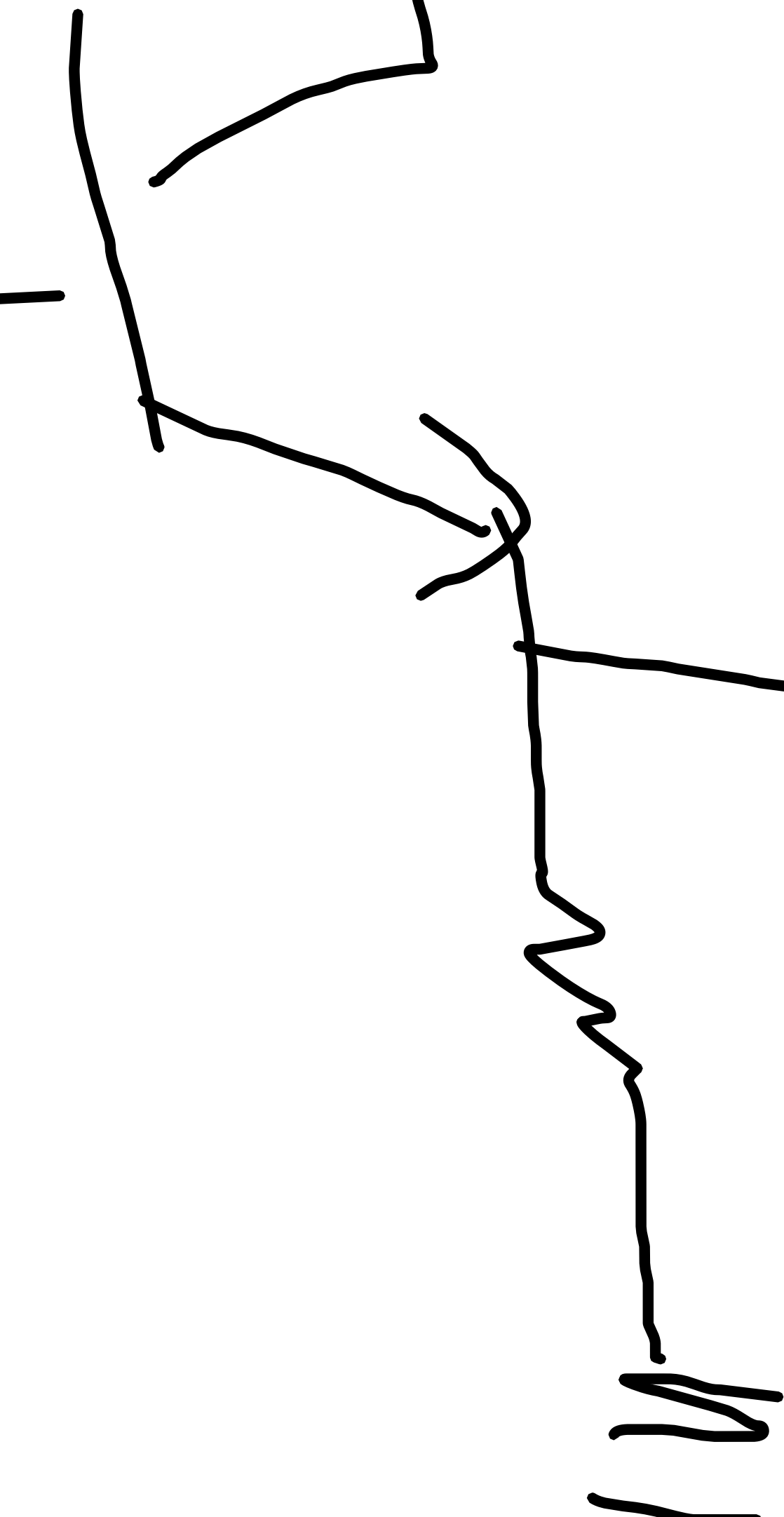
V_{in1}

V_{in2}

NAND



V_{in1}



V_{out}

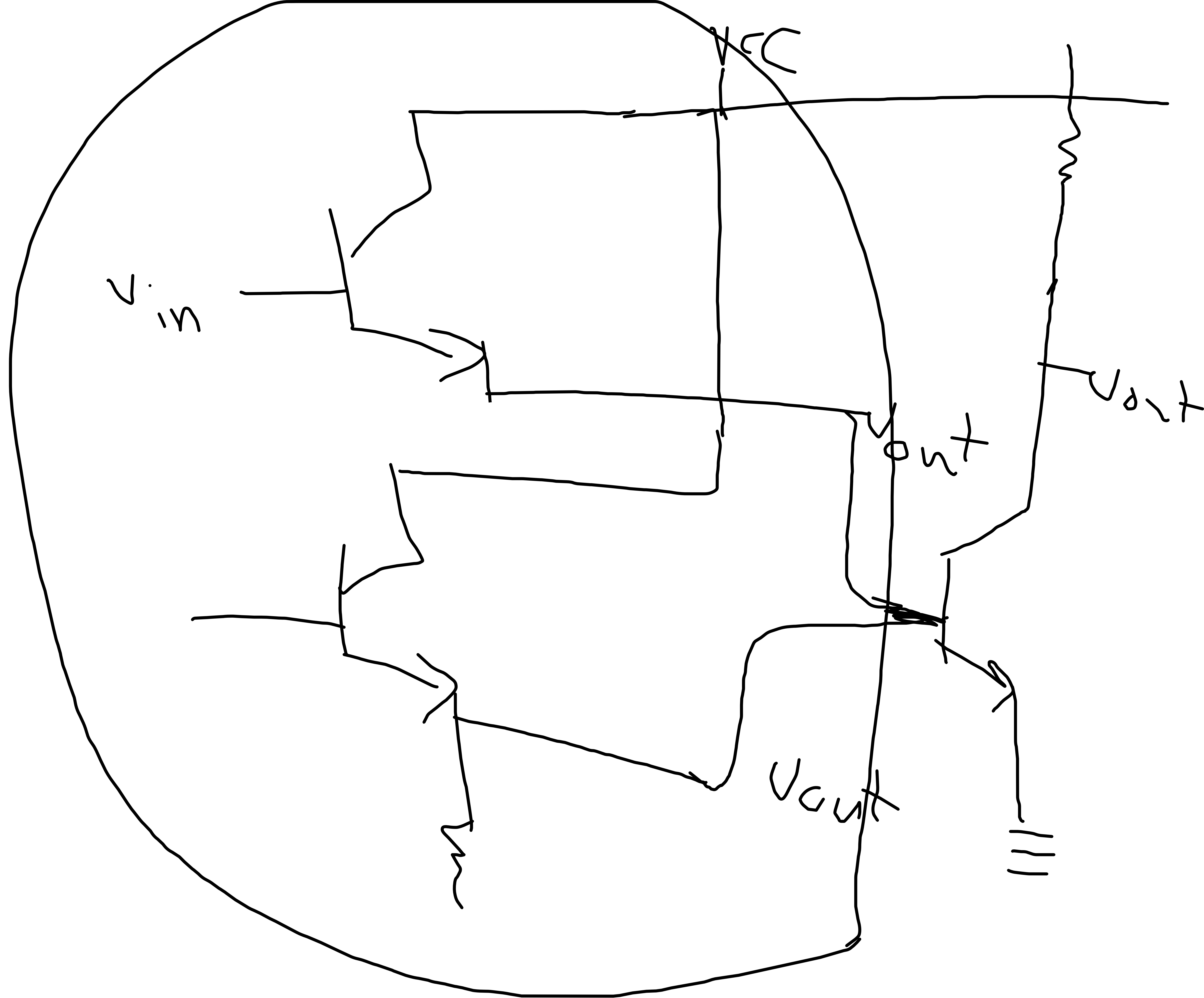


~~NOT~~

NOR

Not + OR

0	0	1
0	1	0
1	0	0
1	1	0



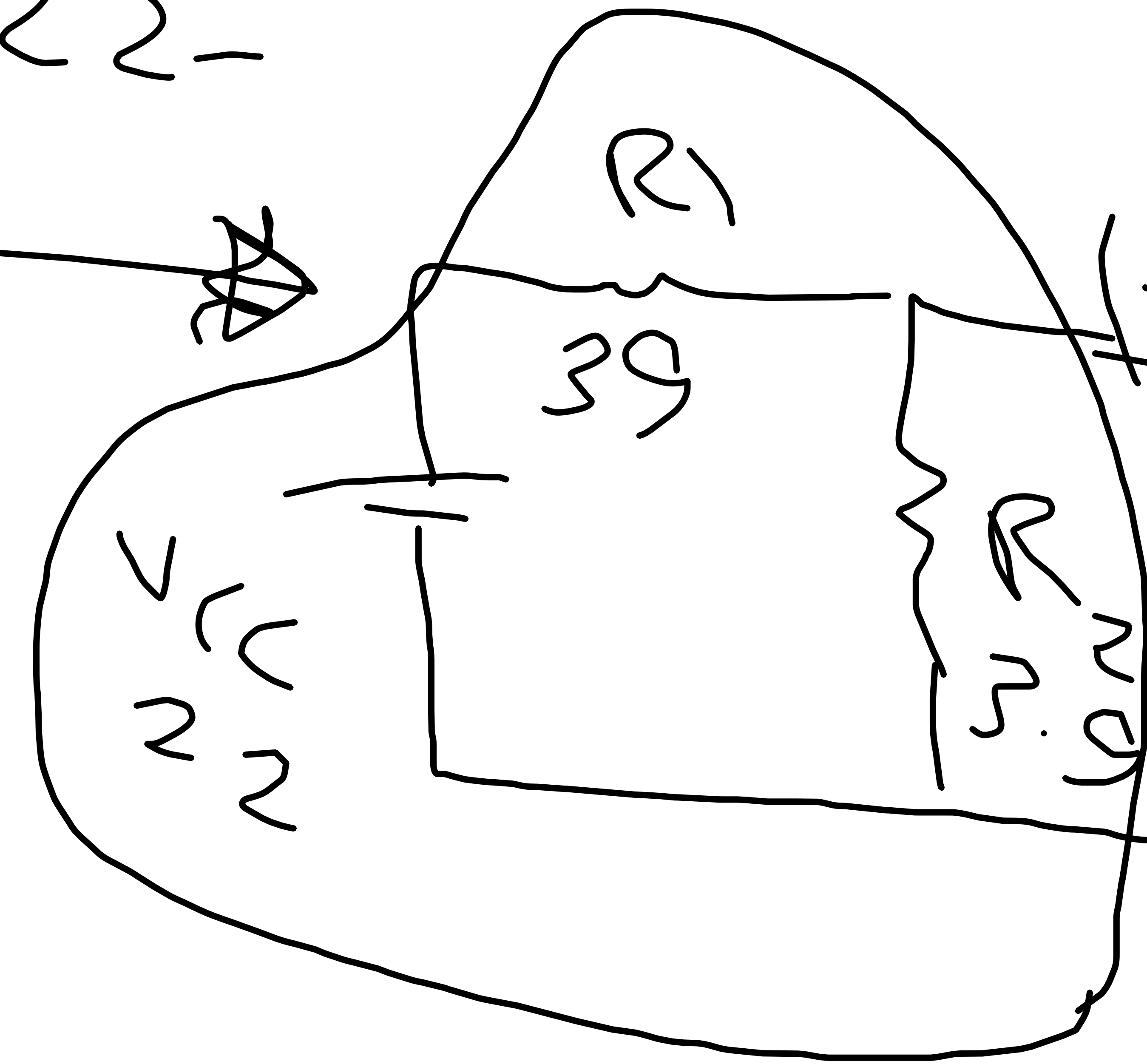
$$= 39113.9$$

$$R_{th} = 3.55$$

$$\beta = 140$$

$$V_{CE} = V_{CC} - I_C (R_E + R_C)$$

$$= 22 -$$



$$I_B = \frac{V_{th} - V_{BE}}{R_{th} + (\beta + 1) R_E}$$

$$= \frac{22 - 0.7}{3.55 + (141) 1.5} = 0.7$$

$$V_{CE} = 22 - I_C (R_E + R_C)$$

$$= 22 - 0.7 (1.5 + 39) = 22 - 27.8 = -5.8$$

