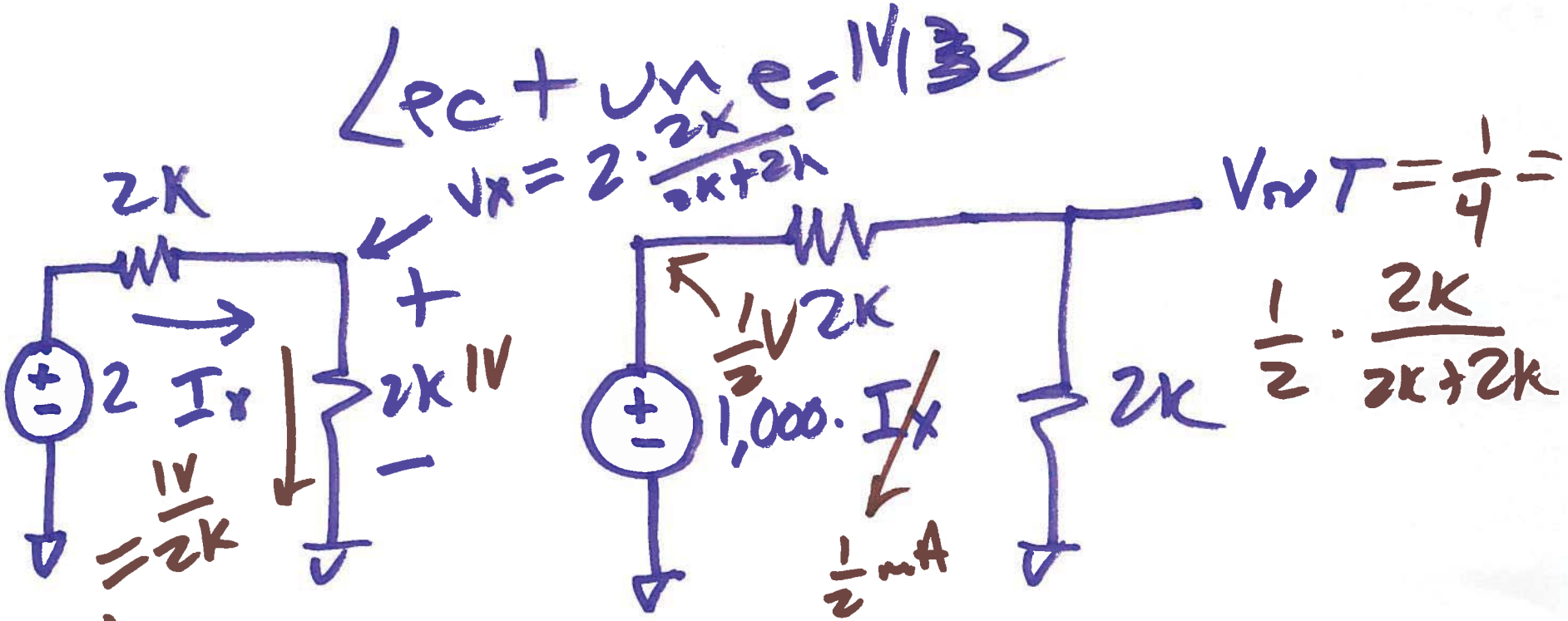
EE 220

Circuits 1



$\angle pc + un e = 1V|32$

$V_x = 2 \cdot \frac{2K}{2K+2K}$

$V_{NT} = \frac{1}{4} =$

$\frac{1}{2} \cdot \frac{2K}{2K+2K}$

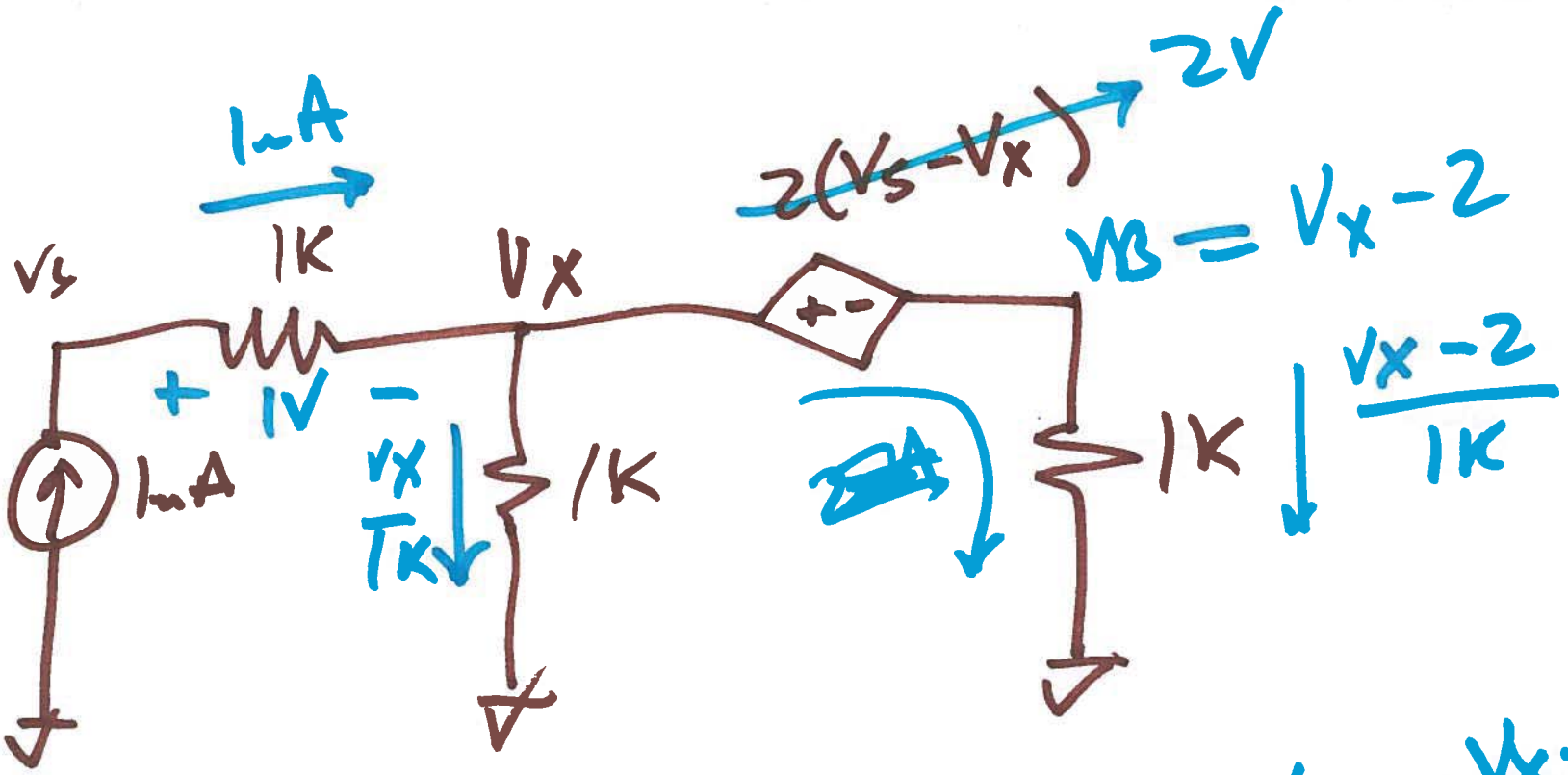
$\frac{1V}{2K} = \frac{1}{2}mA$

$\frac{1}{2}mA$

$I_x = \frac{2}{4K} = \frac{1}{2}mA$

$1{,}000 \times 0.0005$

$1{,}000 \times \frac{1}{2} \cdot 10^{-3}$



$$(V_s - V_x) = 1$$

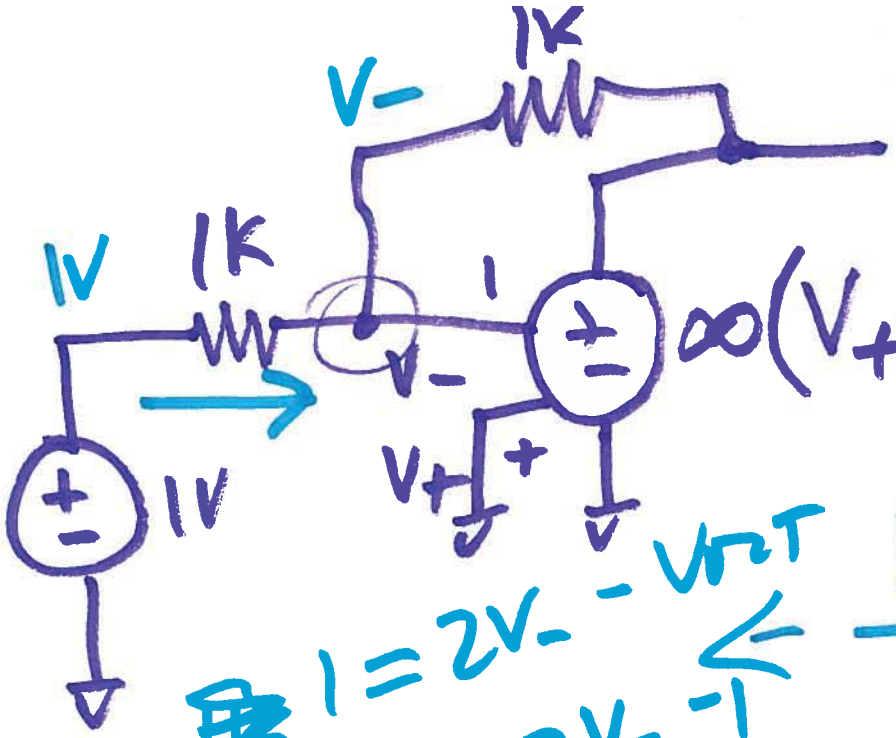
$$1mA = \frac{V_x}{1K} + \frac{V_x - 2}{1K}$$

$$V_B = 1.5 - 2$$

$$= -\frac{1}{2} V$$

$$1 = 2V_x - 2$$

$$V_x = \frac{3}{2} V = 1.5V$$



$$\infty(V_+ - V_-) = \infty(0 - V_-) = V_{OUT}$$

$$I = \frac{1 - V_-}{1K} = \frac{V_- - V_{OUT}}{1K}$$

$$I = 2V_- - V_{OUT} \Leftarrow$$

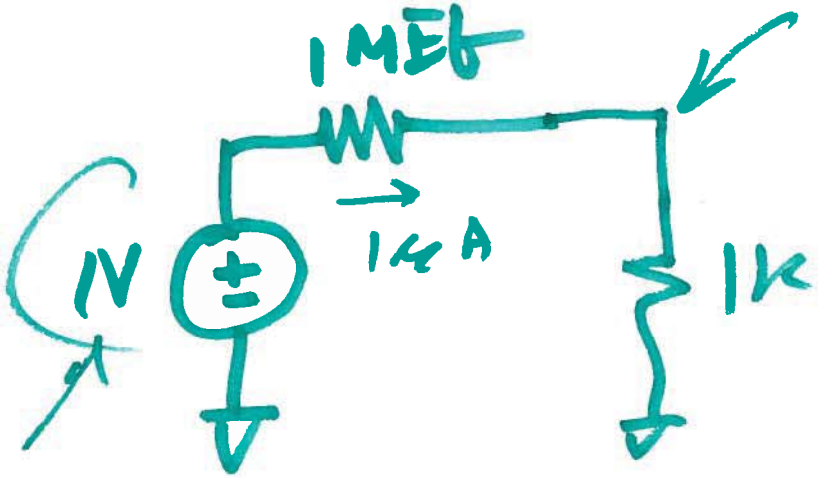
$$V_{OUT} = 2V_- - 1$$

$$\infty(0 - V_-) = V_{OUT} = 2V_- - 1$$

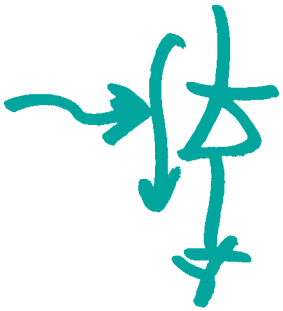
$$\frac{V_{OUT}}{V_{IN}} = \frac{-R_F}{R_I} = -1 \qquad V_- = 0$$

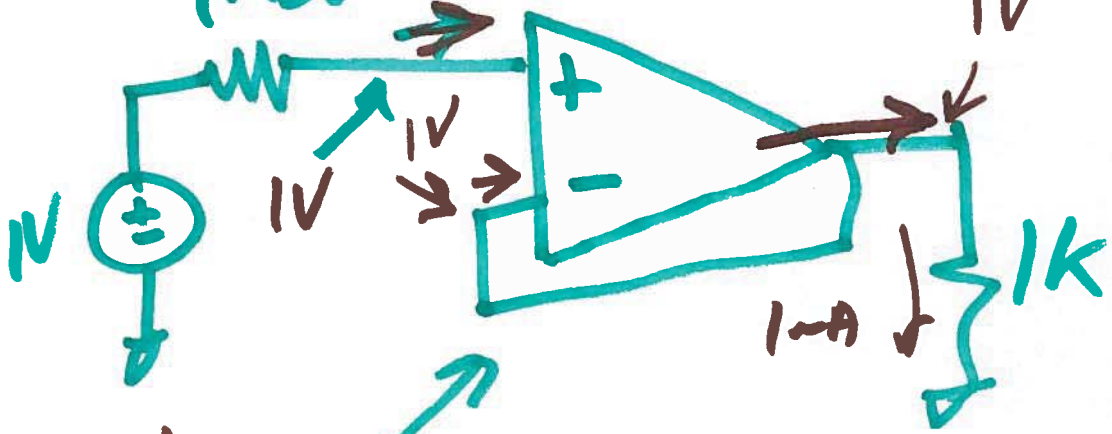
$$V_{IN} = 1V \qquad V_{OUT} = -1$$

$$V_{OUT} = -1V$$



$1V \cdot \frac{1k}{1{,}000k + 1k} = \text{small voltage} \sim 1\text{-}V$

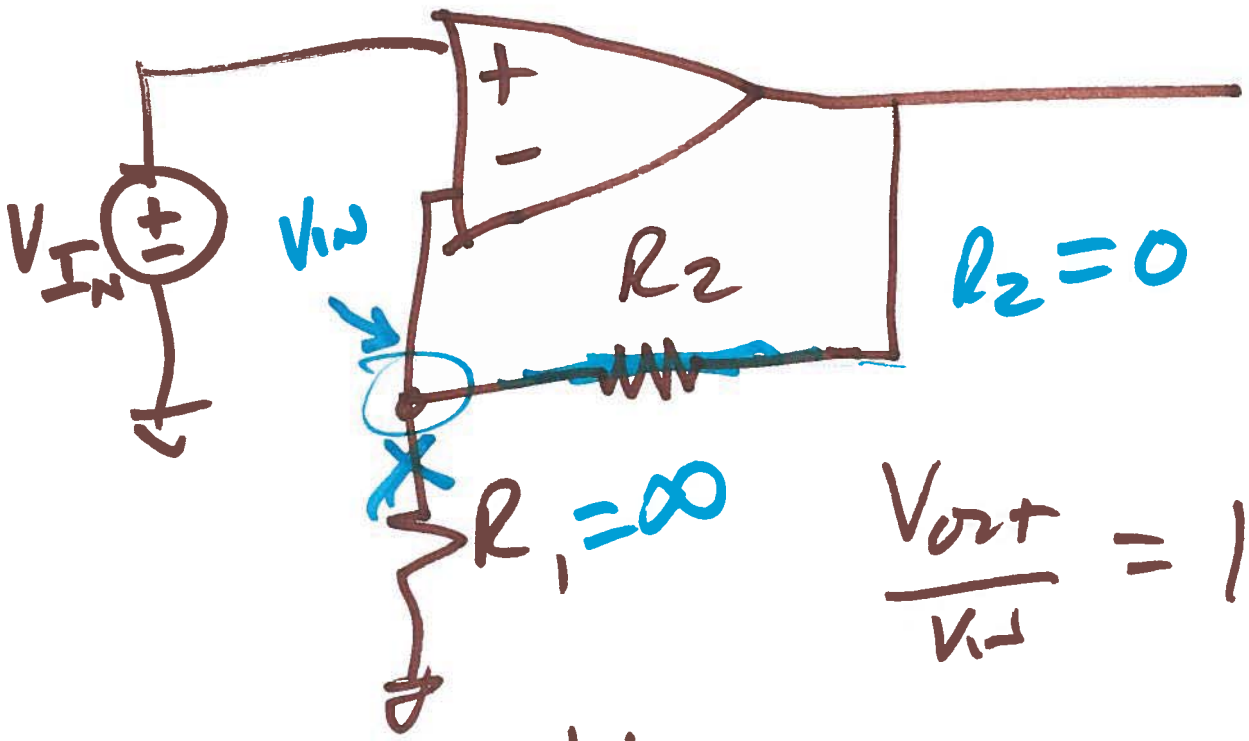




Unity follower

$\frac{V_{OUT}}{V_{IN}} = 1$

Voltage follower

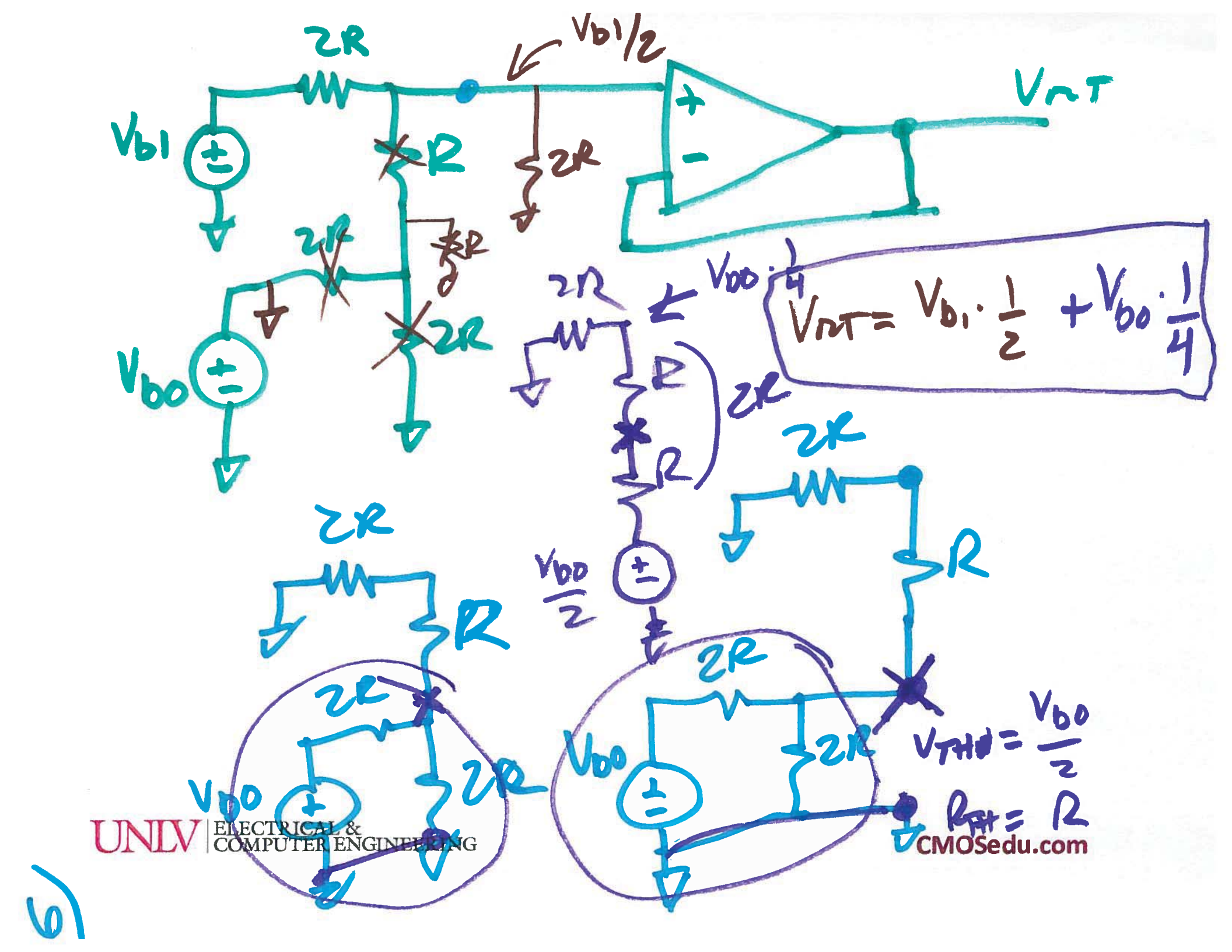


$V_{OUT} \simeq V_{IN}$

$R_2 = 0 \quad \frac{V_{OUT}}{V_{IN}} = 1\,V/V$

$$\frac{V_{OUT}}{V_{IN}} = 1 + \frac{R_2}{R_1} \xrightarrow{R_2 \to 0} \frac{R_1 + R_2}{R_1} \xrightarrow{R_1 \to \infty}$$

NON-INVERTING


2R
$V_{b1}/2$
V_{b1}
R
2R
V_{OUT}
+
−
2R
R
2R
$V_{DD}\cdot\frac{1}{4}$
V_{DD}
2R
R
2R
$V_{OUT} = V_{b1}\cdot\frac{1}{2} + V_{DD}\cdot\frac{1}{4}$
2R
R
$\frac{V_{DD}}{2}$
2R
R
2R
2R
R
2R
V_{DD}
2R
V_{DD}
$V_{THH} = \frac{V_{DD}}{2}$
$R_{TH} = R$
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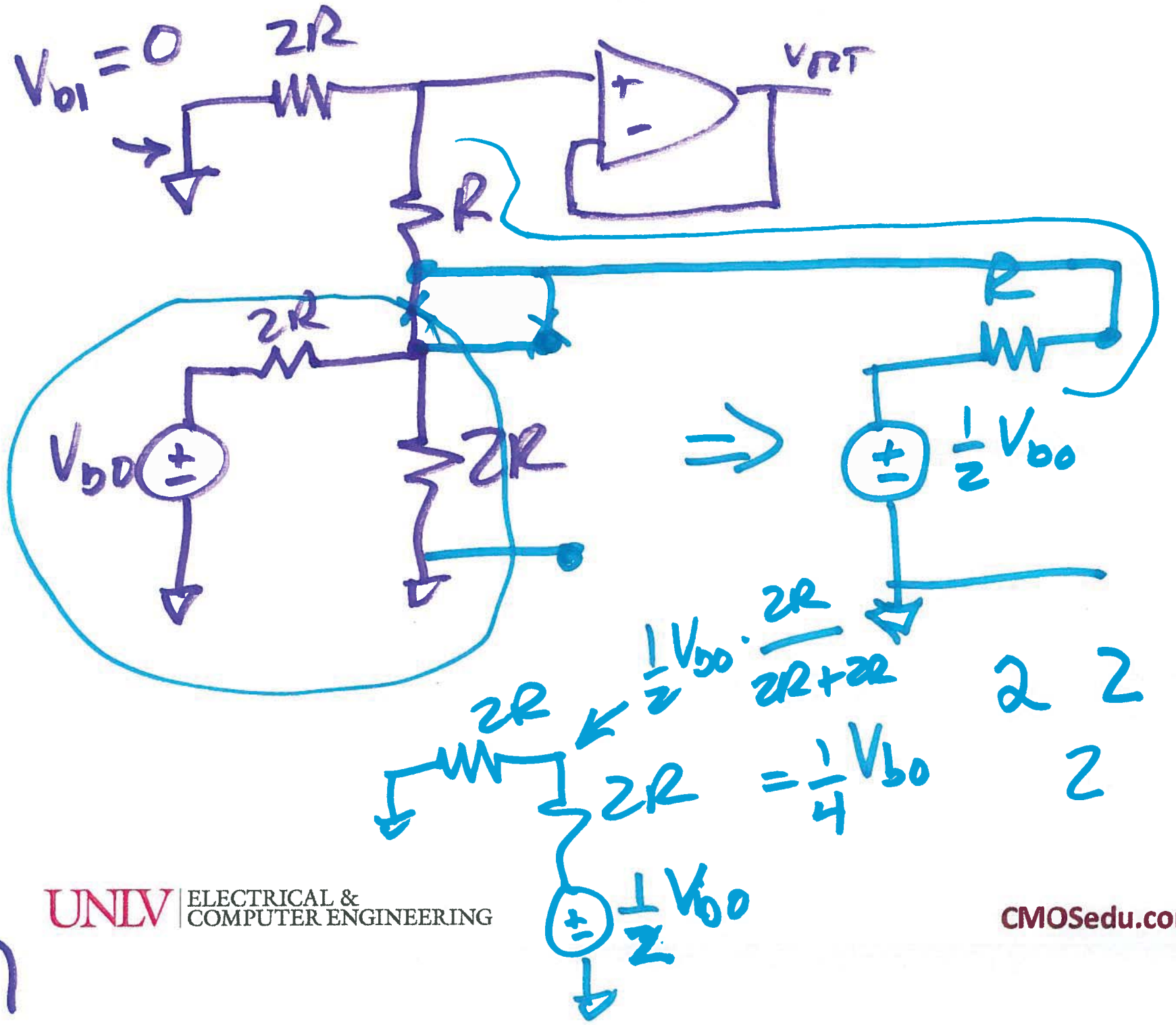
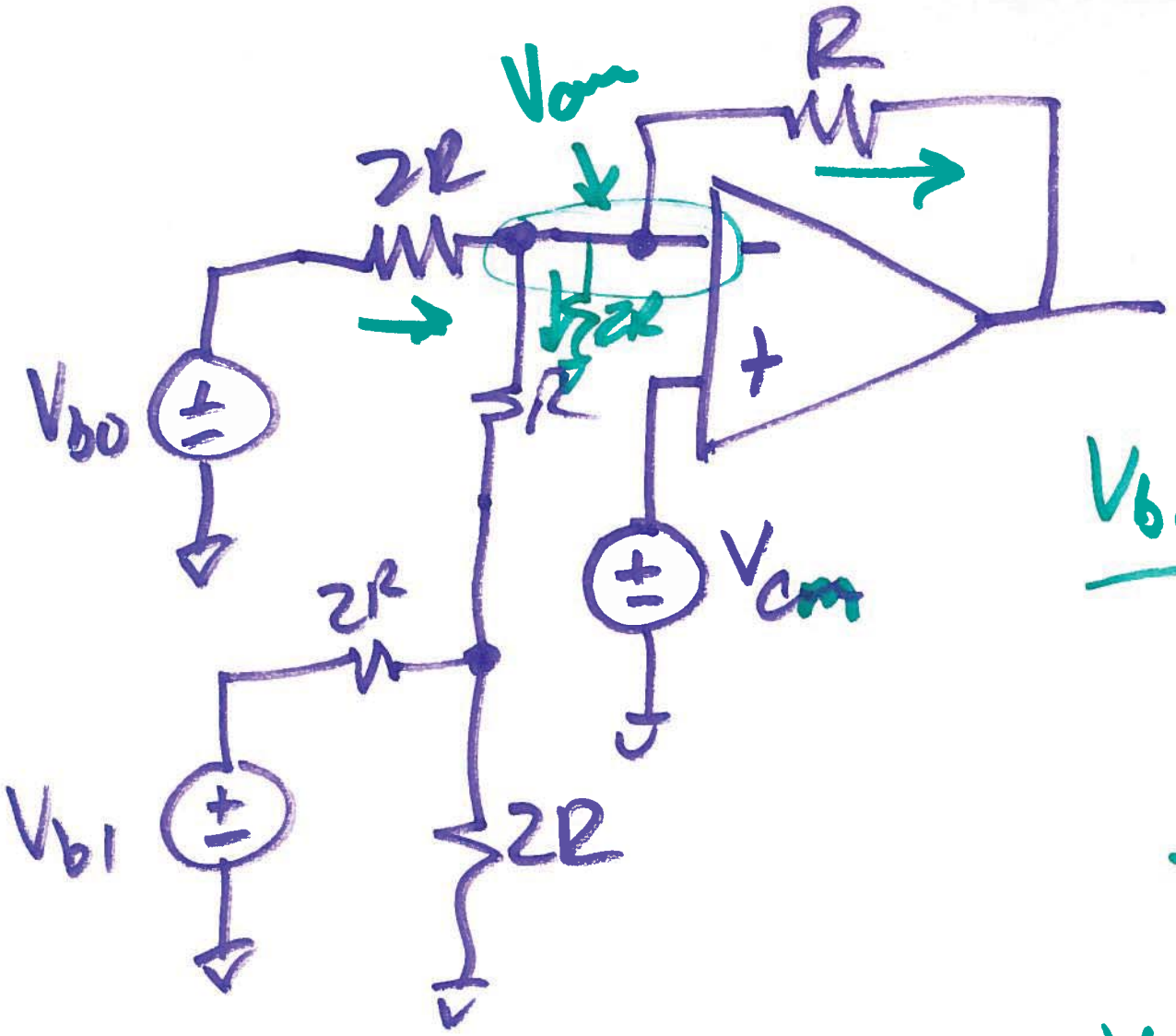
6)


$V_{01}=0$
2R
R
V_{OUT}
2R
V_{DD}
2R
R
$\frac{1}{2}V_{DD}$
$\frac{1}{2}V_{DD}\cdot\frac{2R}{2R+2R}$
$=\frac{1}{4}V_{DD}$
2R
2R
$\frac{1}{2}V_{DD}$



$$\frac{V_{b0} - V_{cm}}{2R} = \frac{V_{cm}}{2R} + \frac{V_{cm} - V_{out}}{R}$$

$$V_{out} = -V_{b0} \cdot \frac{1}{2} + 2V_{cm}$$