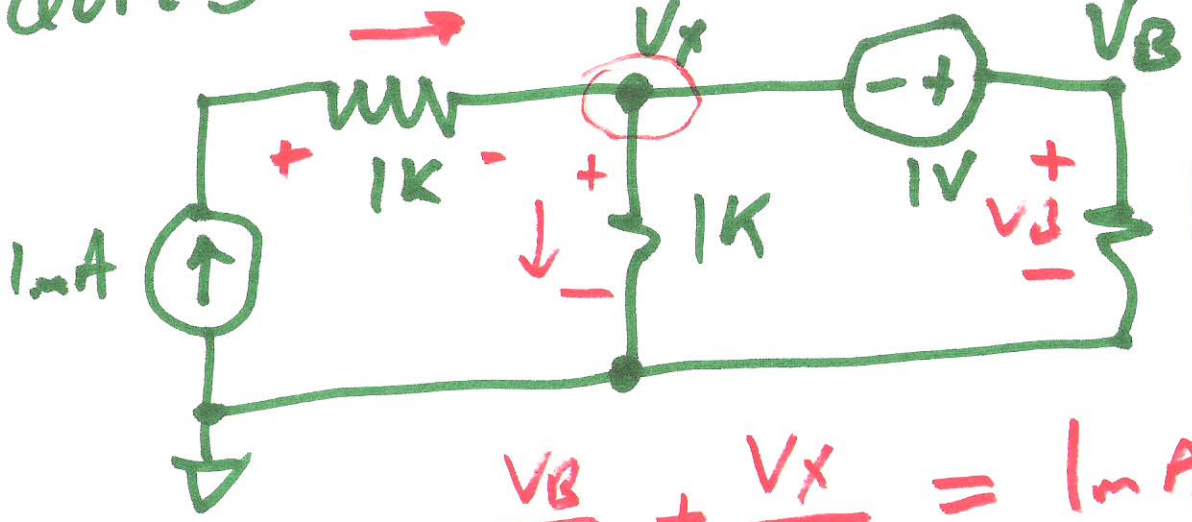
Lecture 7

EE 220

6/17/2014

Quizs work ch. 3 proble-s



find Vx

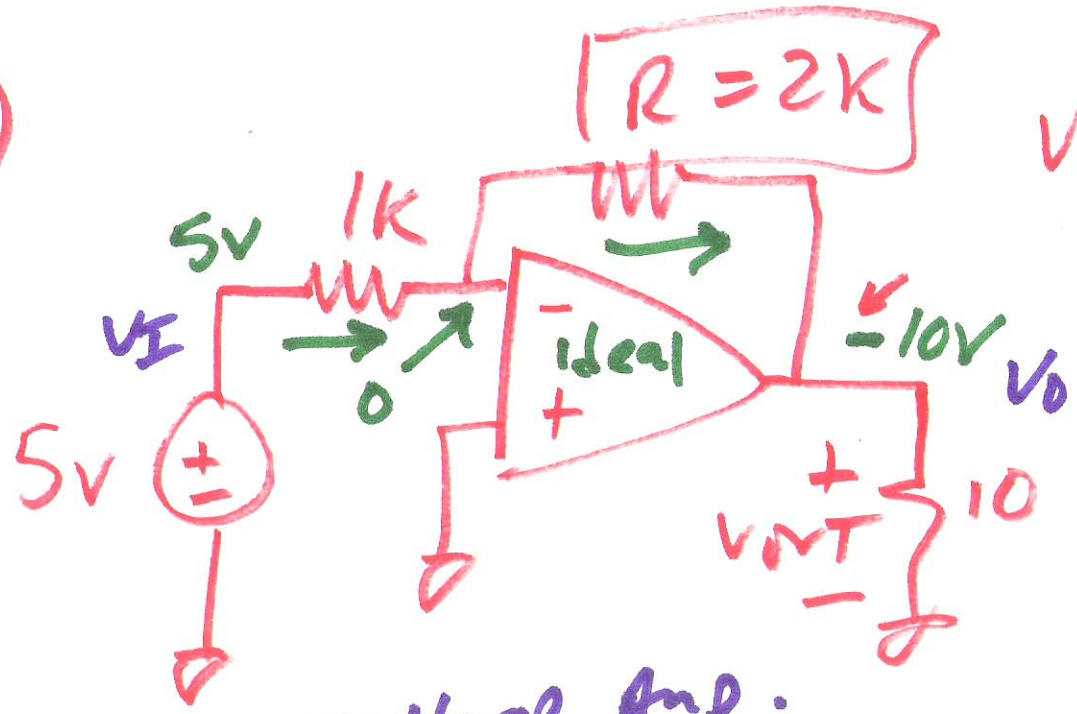
$$\frac{V_B}{1K} + \frac{V_x}{1K} = 1mA, \quad V_B = V_x + 1$$

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

$$2V_x + 1 = 1, \quad \boxed{V_x = 0}$$

1)

5.)



Value of R so power diss. by 10Ω is 10 watts

$$P = \frac{V_{RT}^2}{R} = 10$$

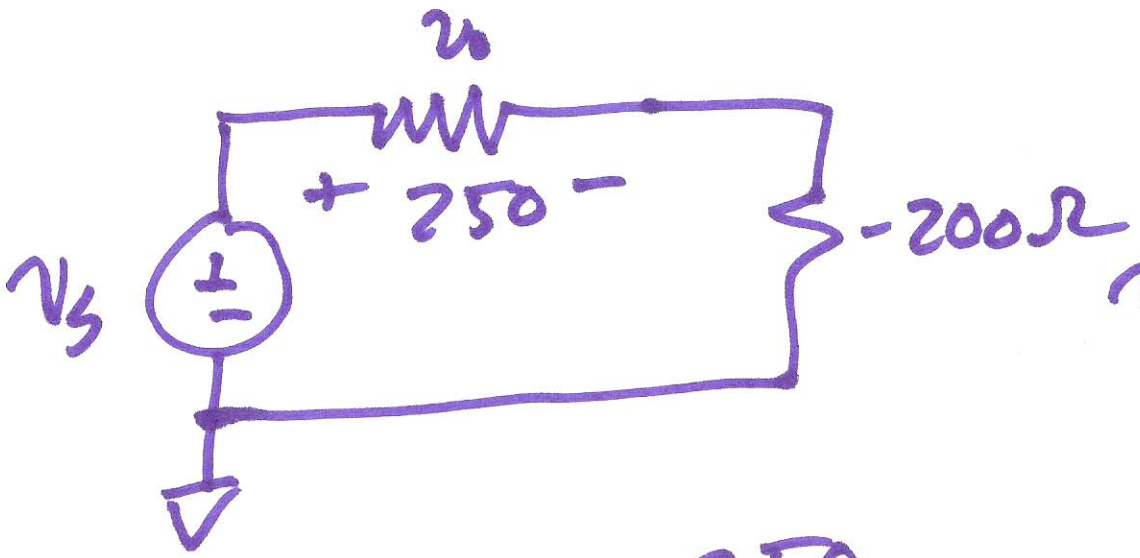
$$V_{RT} = \sqrt{100} = \pm 10V$$

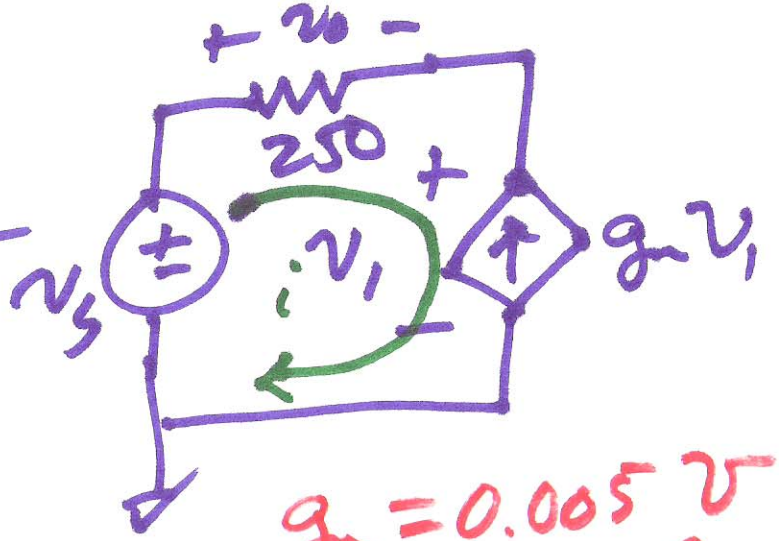
$$R = \frac{10K}{5} = \underline{2k}$$

$$GAIN = \frac{V_o}{V_I} = \text{Voltage Amp.}$$

$$\frac{5}{1K} = \frac{0 - 10}{R} = \frac{0 - (-10)}{R}$$

R = Negative wrong!





$$v_o = v_s \cdot \frac{250}{250 - 200}$$

$$\boxed{\frac{v_o}{v_s} = 5}$$

$g_m = 0.005\ \mho$

OHM SEIMENS

$\frac{1}{R}$ = CONDUCTANCE.

$$1.25 = \frac{5}{4}$$

$$v_s = v_o + v_1$$

$$v_o = 250\, i = -g v_1 \cdot 250$$

$$v_1 = \frac{v_o}{-g_m \cdot 250} = \frac{v_o}{-.005 \cdot 250} = \frac{v_o}{-1.25}$$

$$v_s = v_o\left(1 + \frac{1}{-1.25}\right)$$

$$\frac{v_o}{v_s} = 1 + \frac{-4}{5} = \frac{1}{5}$$

$$\boxed{\frac{v_o}{v_s} = 5}$$

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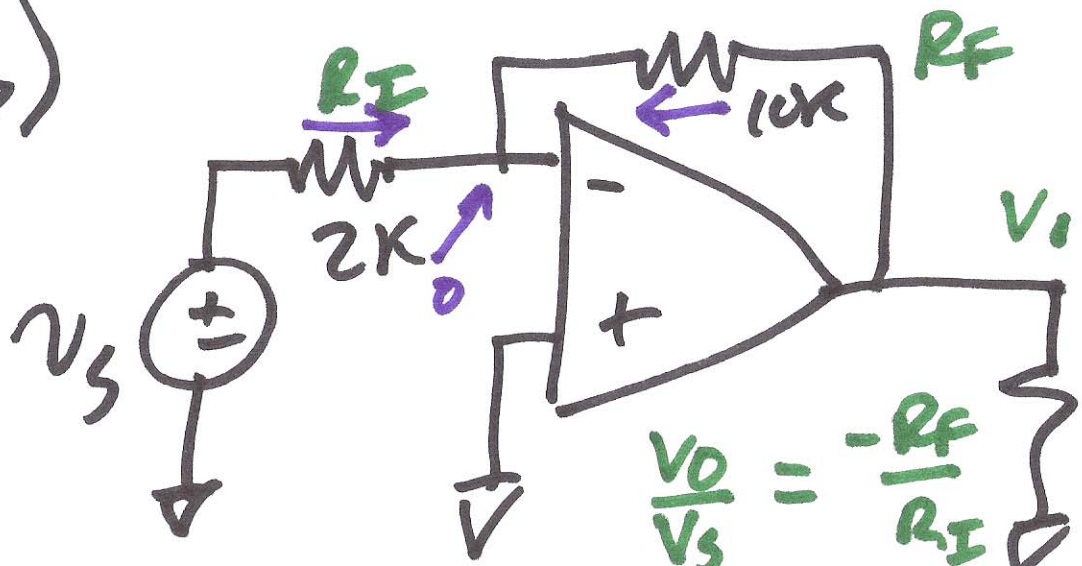
3)

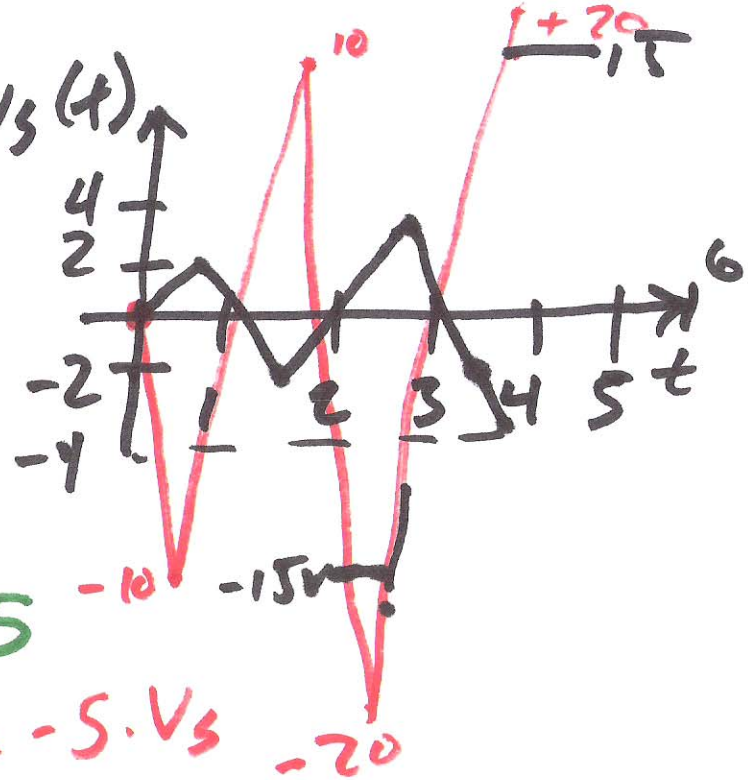
6)



$$\frac{V_o}{V_s} = -\frac{R_F}{R_I}$$

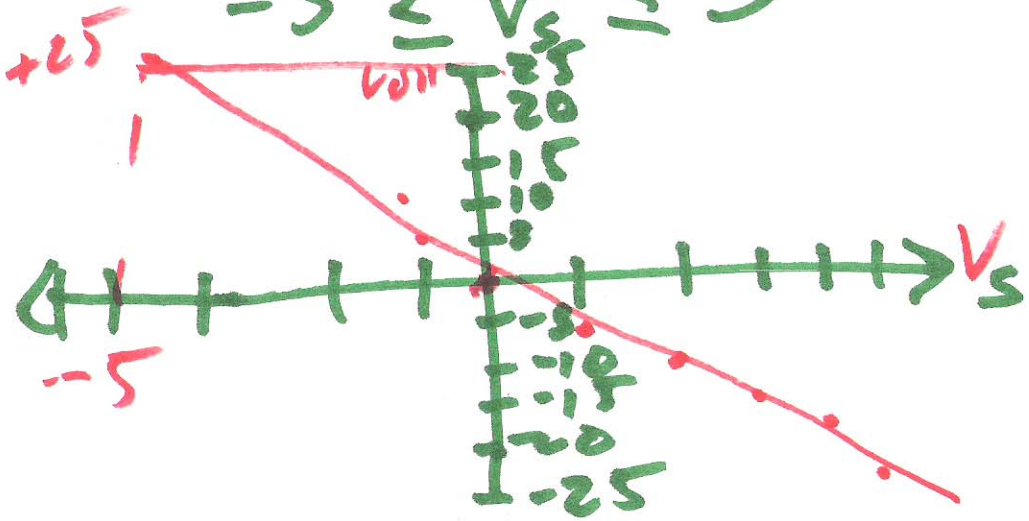
$$= -5$$

$$V_o = -5 \cdot V_s$$



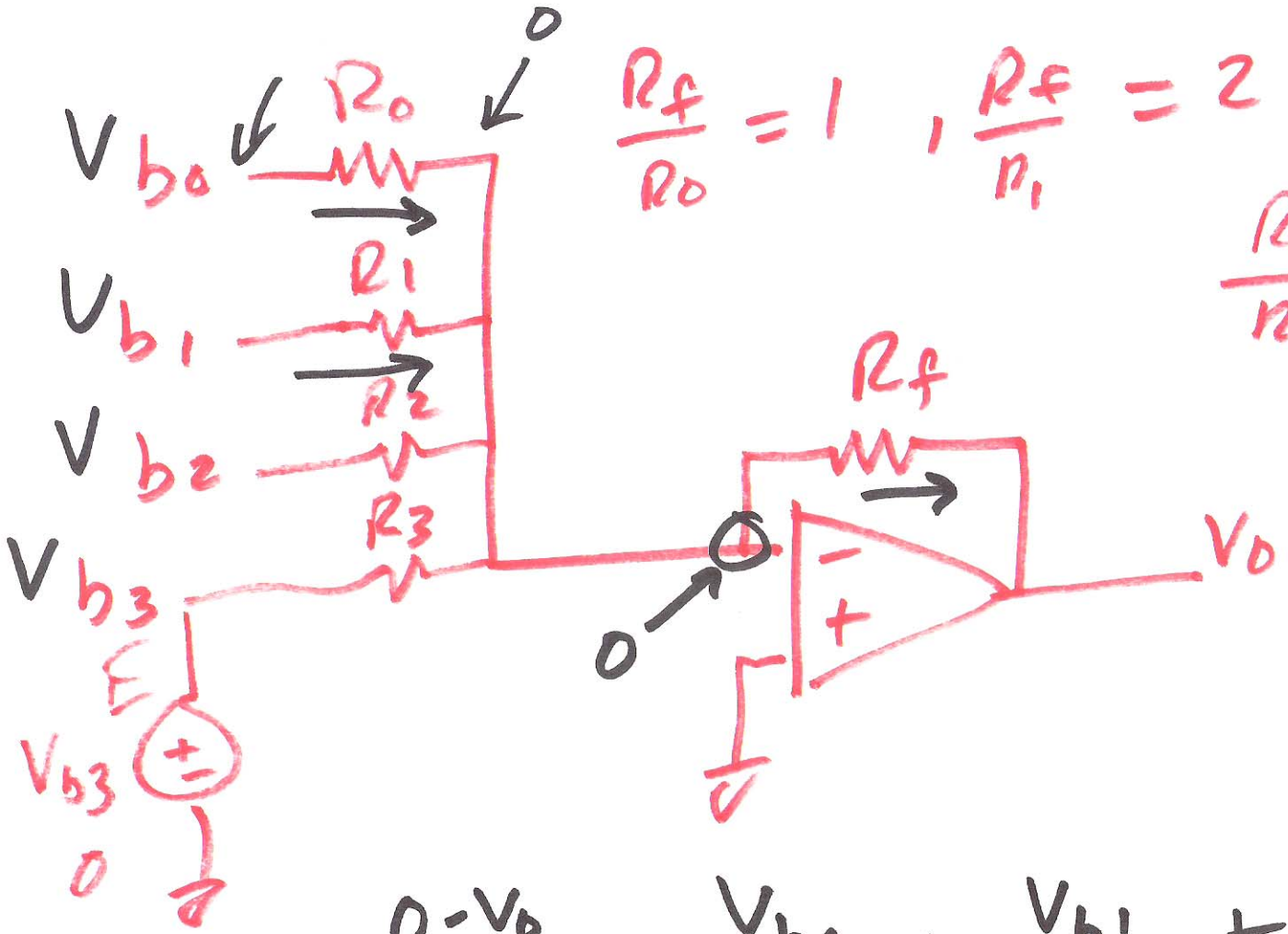
Plot V_o vs. V_s

$$-5 \le V_s \le 5$$



$$\frac{v_s}{2K} + \frac{v_o}{10K} = 0$$

$$v_o = -5 \cdot v_s$$



$\frac{R_f}{R_0} = 1$, $\frac{R_f}{R_1} = 2$ & $\frac{R_f}{R_2} = 4$

$\frac{R_f}{R_3} = 8$

$$\frac{0 - V_o}{R_f} = \frac{V_{b0}}{R_0} + \frac{V_{b1}}{R_1} + \frac{V_{b2}}{R_2} + \frac{V_{b3}}{R_3}$$

$$-V_o = V_{b0} + 2V_{b1} + 4V_{b2} + 8V_{b3}$$

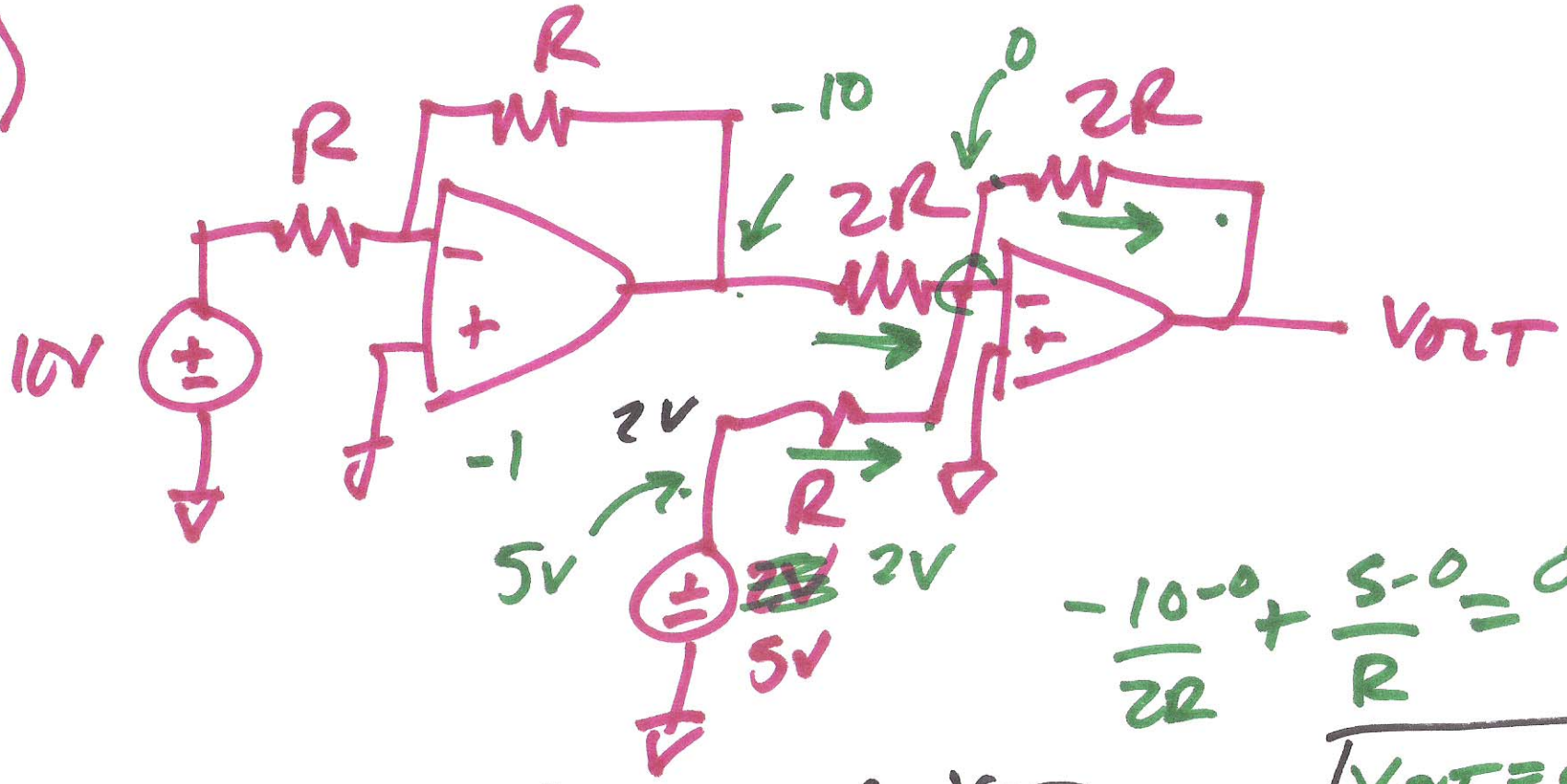
0 0 E

a) E

$-V_o = 9E$

5 a)

14)



$$\frac{-10-0}{2R} + \frac{5-0}{R} = \frac{0-V_{OUT}}{2R}$$

$$V_{OUT} = 0$$

$$\frac{-10-0}{2R} + \frac{2-0}{R} = \frac{0-V_{OUT}}{2R}$$

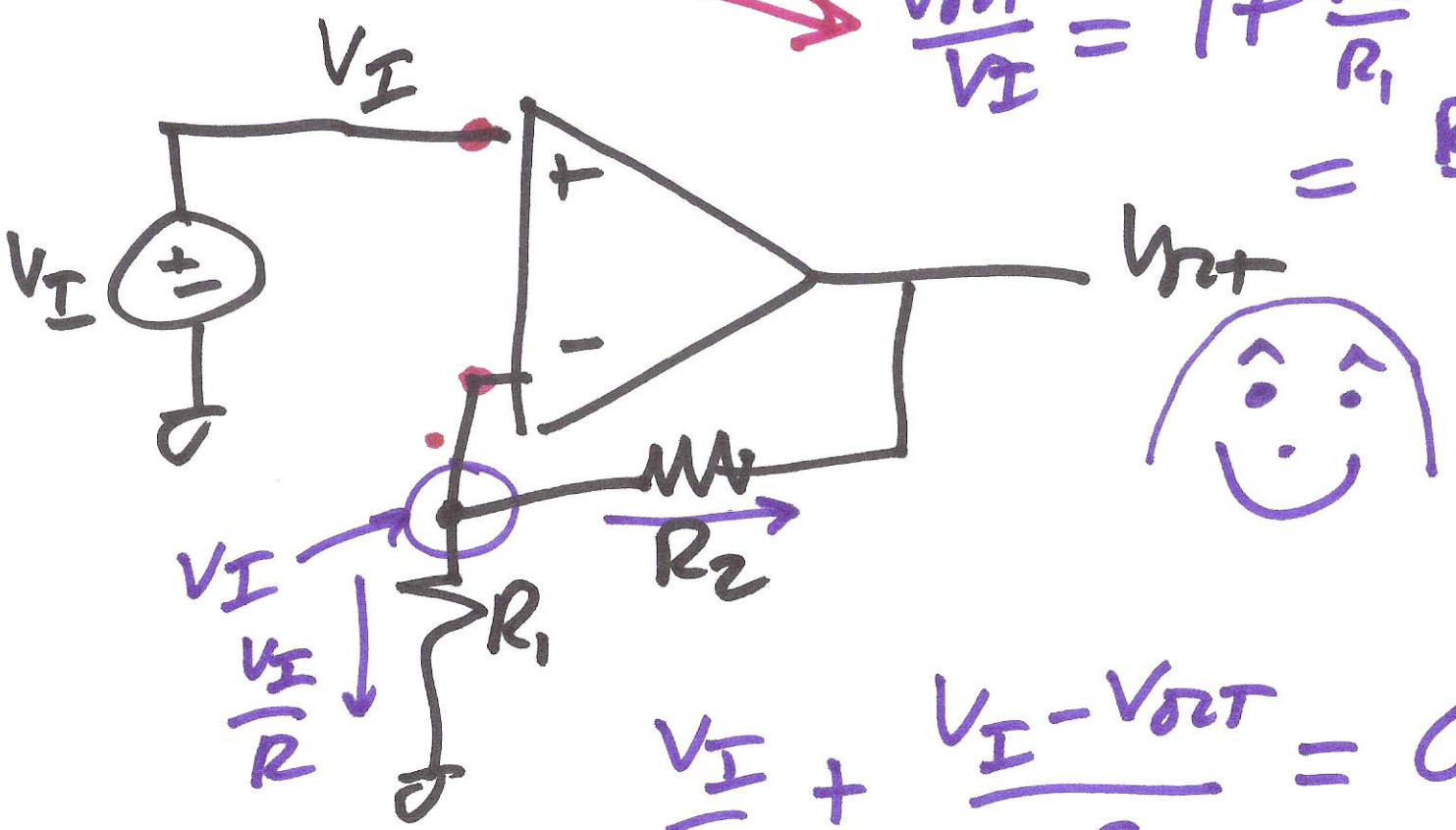
$$-5 + 2 = -V_{OUT}/2$$

$$V_{OUT} = 6V$$

NON - INVERTING

GAIN! (GAIN is positive)

$$\frac{V_{OUT}}{V_I} = 1 + \frac{R_2}{R_1} = \frac{R_1 + R_2}{R_1}$$

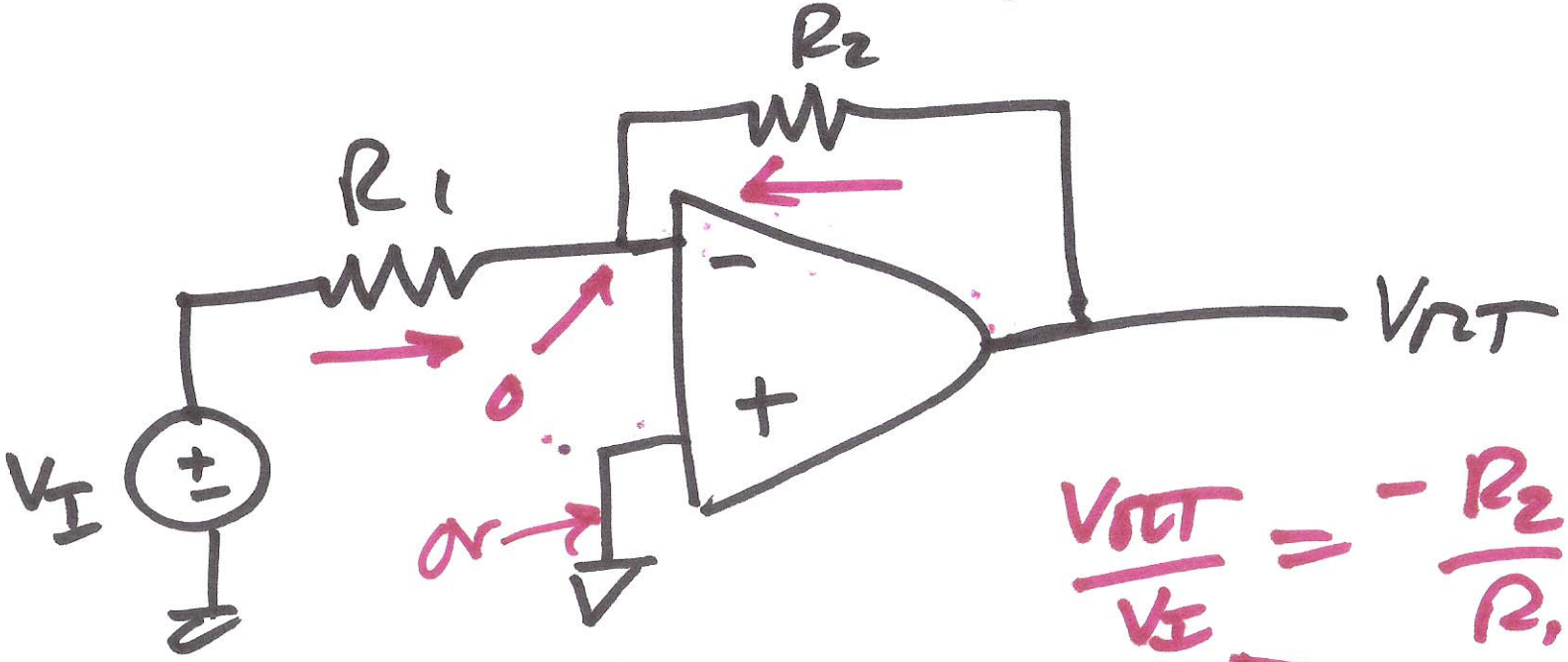


$$\frac{V_I}{R_1} + \frac{V_I - V_{OUT}}{R_2} = 0$$

$$V_I\left(\frac{1}{R_1} + \frac{1}{R_2}\right) = R_2 \cdot V_{OUT}$$

$$V_{OUT} = V_I\left(\frac{R_2}{R_1} + 1\right)$$

Inverting (gain is negative)

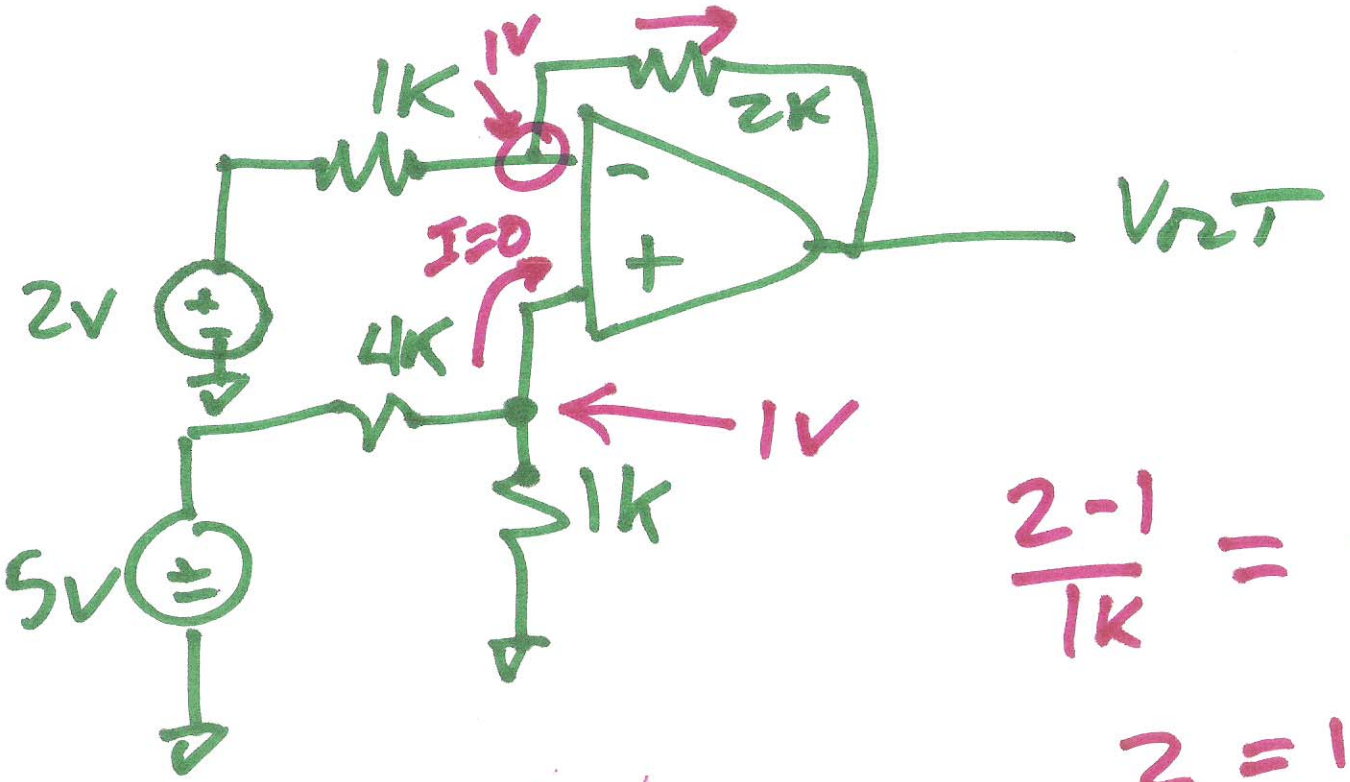


$$\frac{V_{OUT}}{V_I} = -\frac{R_2}{R_1}$$

gain!

$$\frac{V_I}{R_1} + \frac{V_{OUT}}{R_2} = 0$$

$$\frac{V_I}{R_1} = \frac{-V_{OUT}}{R_2}$$



$$5 \cdot \frac{1K}{1K+4K} = 1V$$

Superposition

$$\frac{2-1}{1K} = \frac{1-V_{OUT}}{2K}$$

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

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

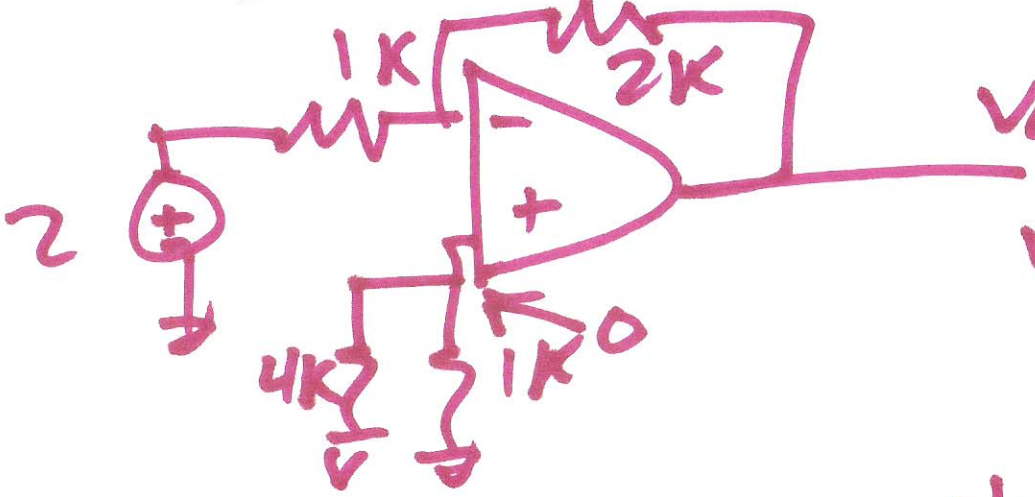
$$V_{OUT} = -2 \cdot \frac{2K}{1K} + 1V \cdot \left(1 + \frac{2K}{1K}\right)$$

$$= -4 + 3 = -1V$$

Superposition

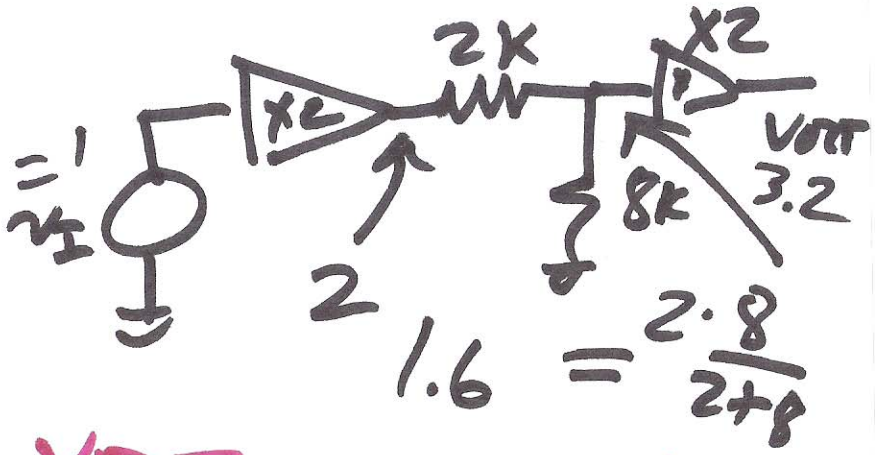
look at 2V source

short out 5V

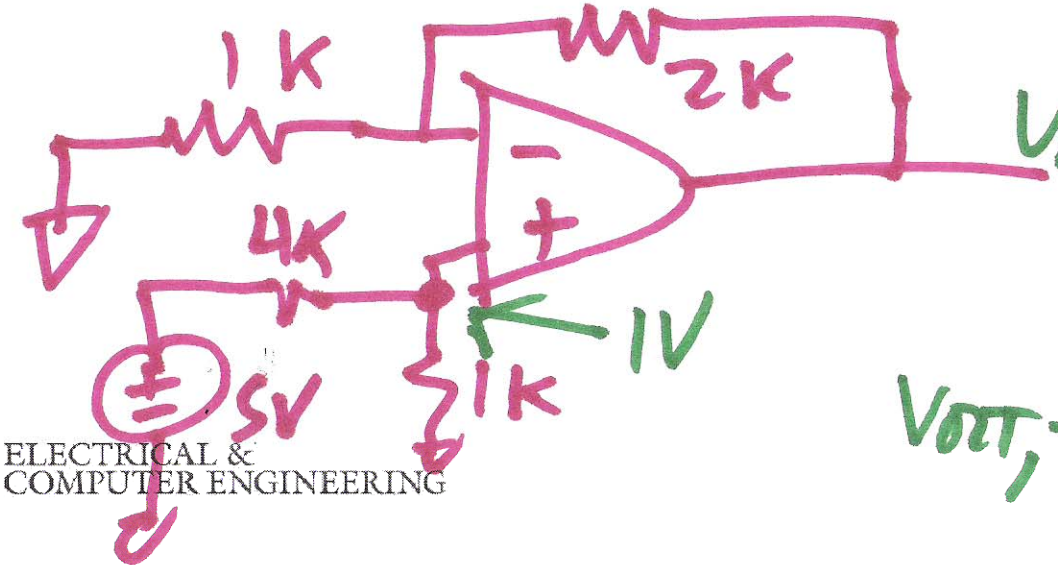


$$V_{OUT} = 2 \cdot \left(-\frac{2K}{1K}\right)$$

$$= -4$$



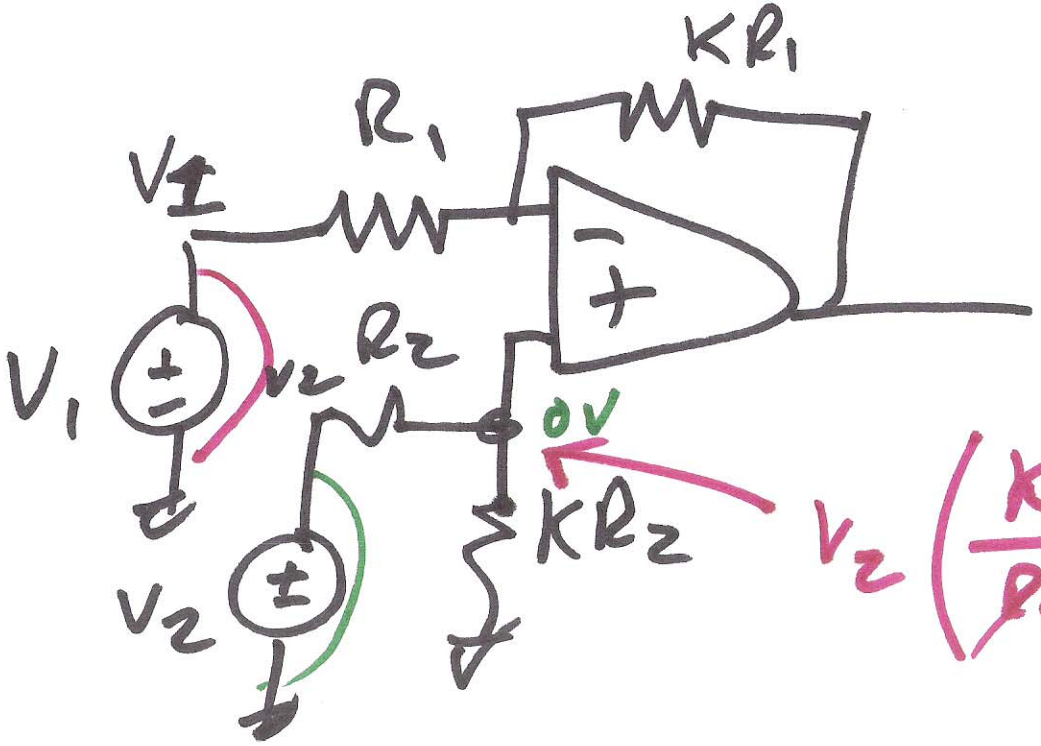
look at 5V source, short out the 2V source.



$$V_{OUT} = 1\left(1+\frac{2K}{1K}\right)$$

$$= 3$$

$$V_{OUT,T} = -4 + 3 = \underline{\underline{-1V}}$$



$$V_{nT} = V_1\left(\frac{-KR_1}{R_1}\right) + V_2\left(\frac{KR_2}{R_2+KR_2}\right)\left(1+\frac{KR_1}{R_1}\right)$$

$$= -kV_1 + V_2 \frac{K}{1+K}\cdot\frac{1+K}{1}$$

$$\boxed{V_{nT} = -kV_1 + kV_2}$$

$$= k(V_2 - V_1)$$