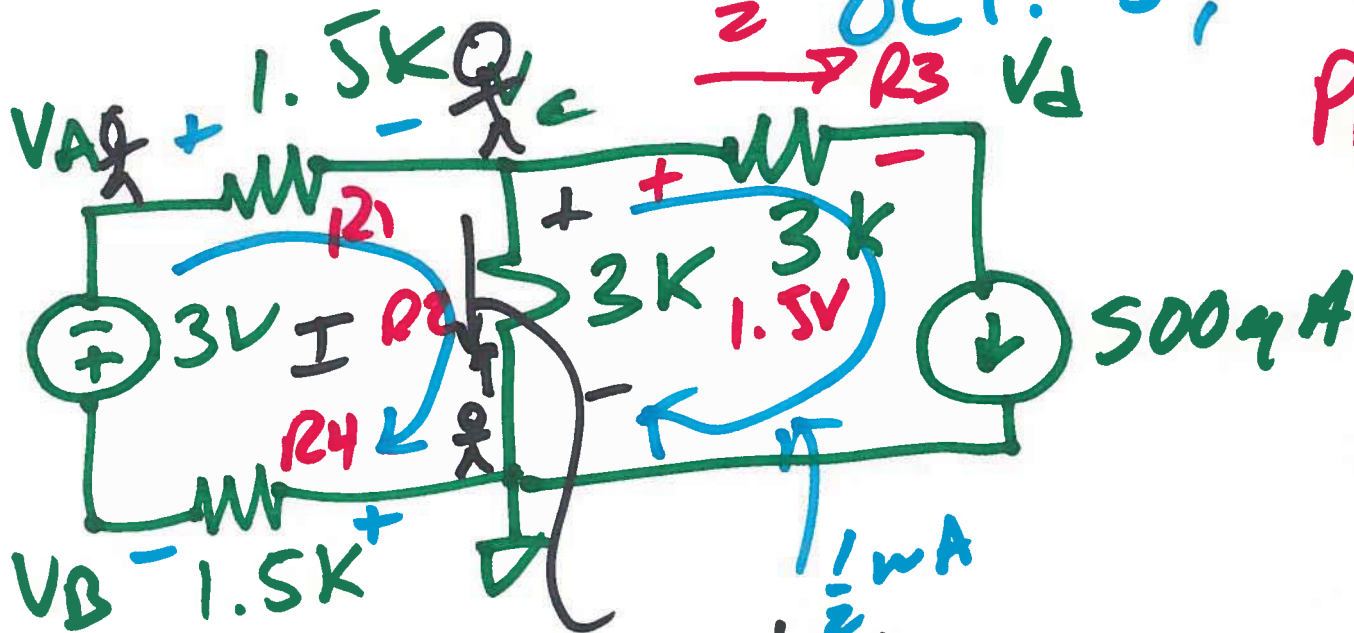


EE 220 Circuits 1

Lecture 12

OCT. 3, 2018



$$P_{R3} = \frac{1}{2} \mu\text{A} \cdot 1.5\text{V}$$

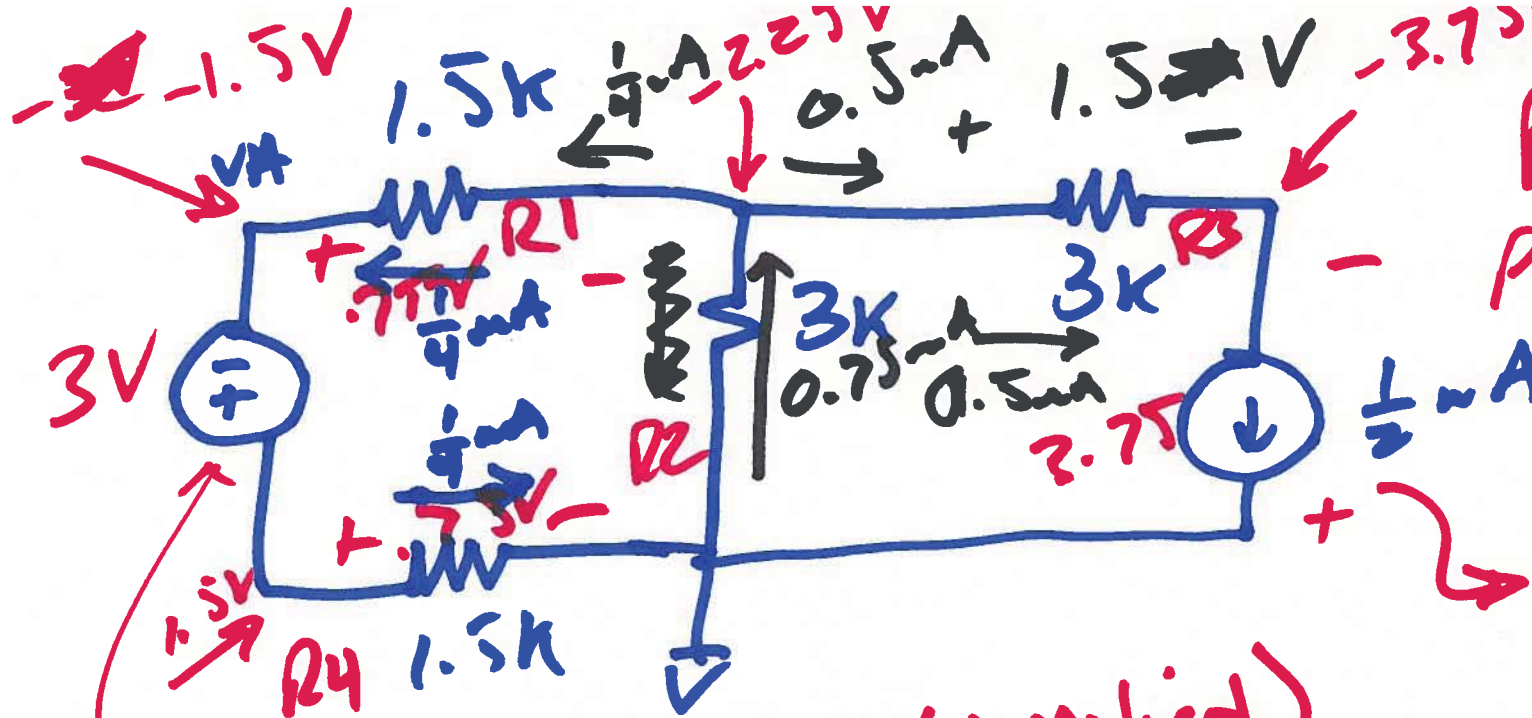
$$= 0.75 \mu\text{W}$$

$$I - 500 \mu\text{A}$$

$$3\text{k}(I - 500 \mu\text{A}) + 1.5\text{k}I + 3\text{V} + 1.5\text{k}I = 0$$

$$I - \frac{1}{2} \mu\text{A} + \frac{I}{2} + 1 \mu\text{A} + \frac{I}{2} = 0$$

$$2I = -\frac{1}{2} \mu\text{A} \quad \boxed{I = 250 \mu\text{A}}$$

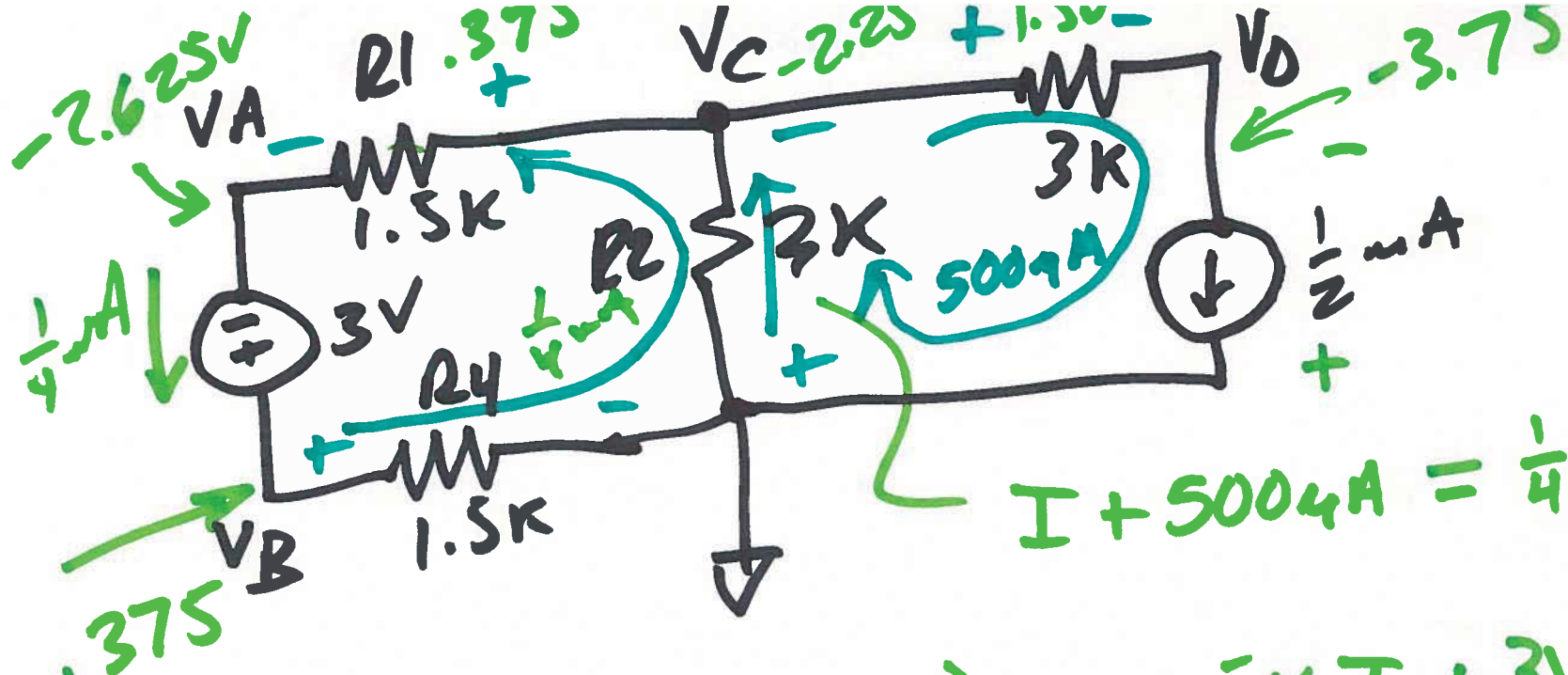


$P_{R3} = 0.75 \mu W$
 $P_{R2} = 2.25 \mu W$
 $= 0.75 \mu A \cdot 2.25V$
 $3.75 \cdot \frac{1}{2} \mu A$

$3V \cdot \frac{1}{4} \mu A = .75 \mu W$ (supplied)

$P_{R1} = P_{R4} = .375 \mu W$

2)

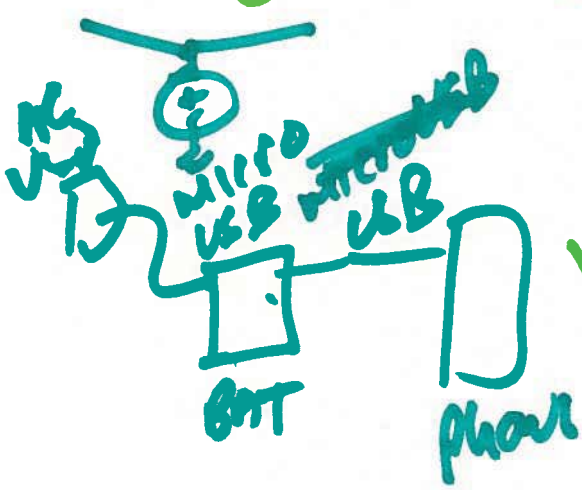


$$I + 500\mu A = \frac{1}{4} \text{ mA} + \frac{1}{2} \text{ mA} = 750\mu A$$

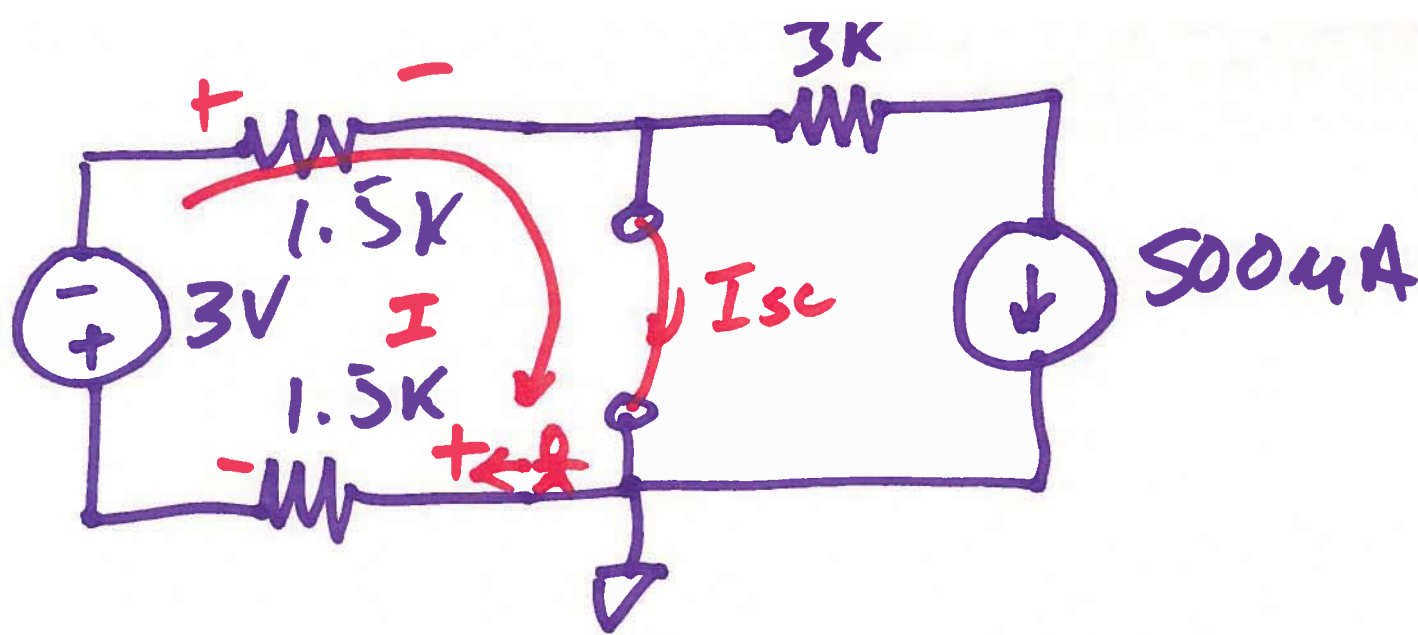
$$0 = 3\text{k}(I + 500\mu A) - 1.5\text{k}I + 3\text{V} - 1.5\text{k}I$$

$$I = 250\mu A = \frac{1}{4} \text{ mA}$$

$$V_c = -3\text{k} \cdot 750\mu A = -2.25\text{V}$$



3)



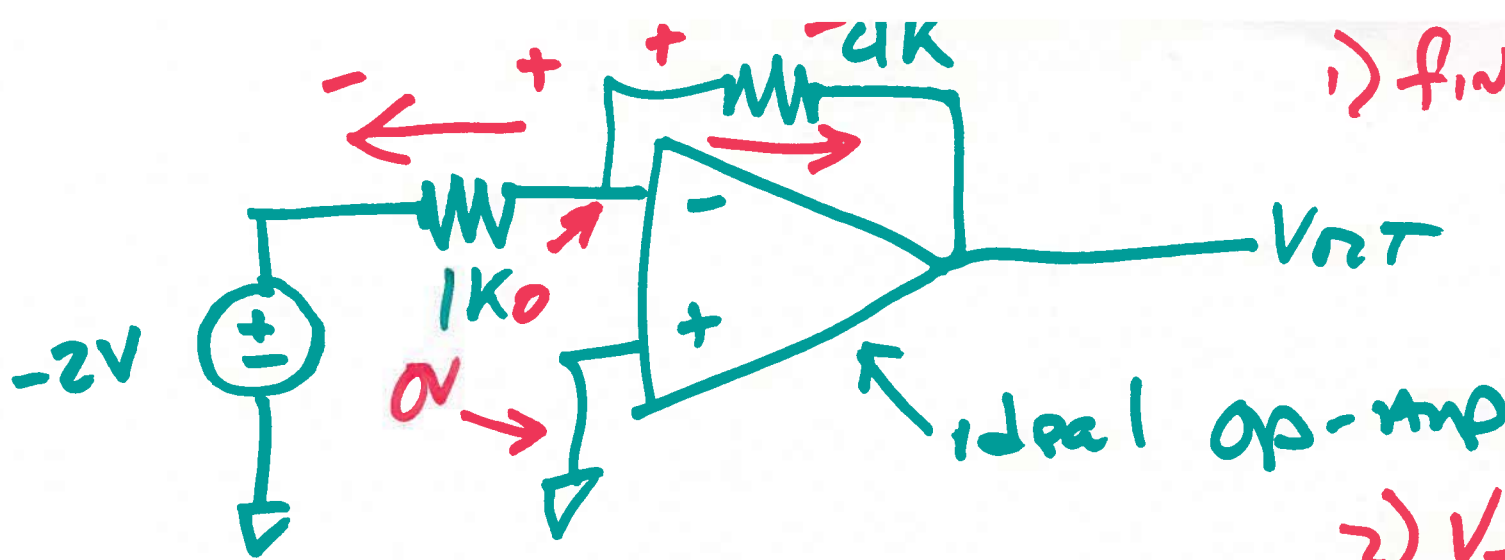
$$-1.5KI - 3 - 1.5KI = 0$$

$$3KI = -3V$$

$$I = -1A$$

$$I_{sc} = -1.5mA$$

4)



1) find non-inverting voltage

V_+

2) $V_+ = V_-$

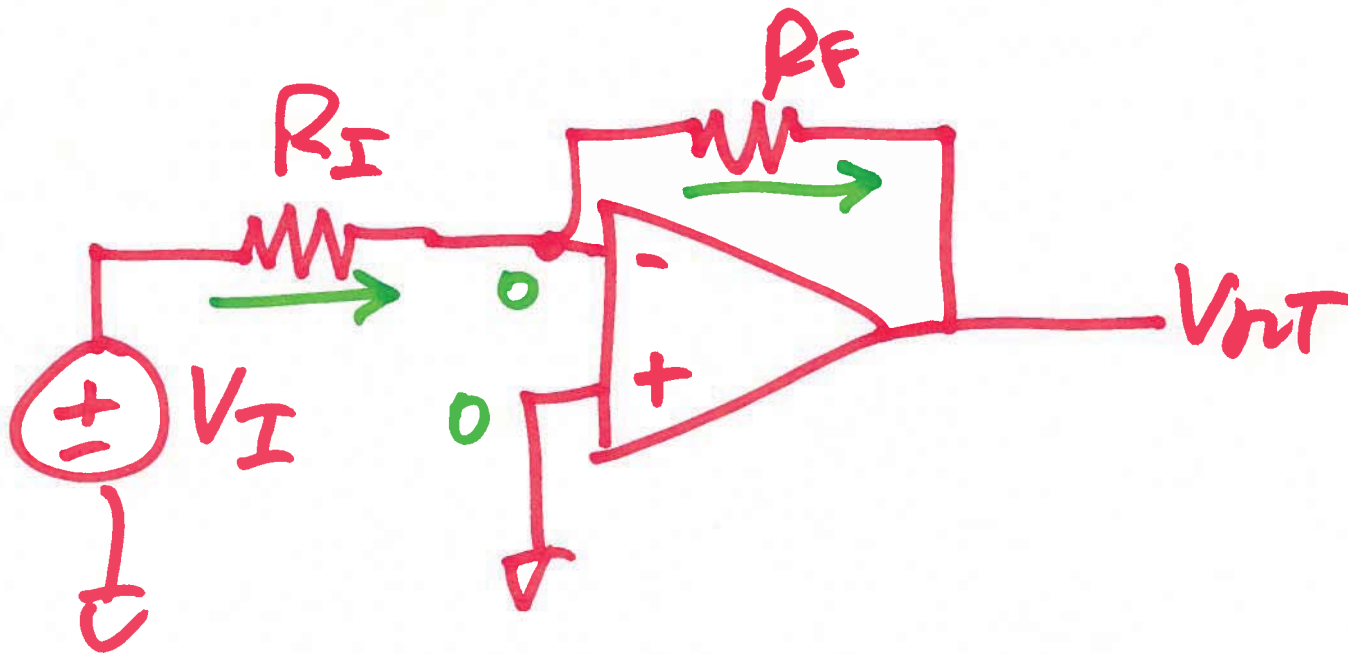
3) KCL AT INVERTING INPUT

$$\frac{0 - (-2V)}{1K} + \frac{0 - V_{out}}{4K}$$

$$\boxed{8V = V_{out}}$$

5)

Inverting op-Amp

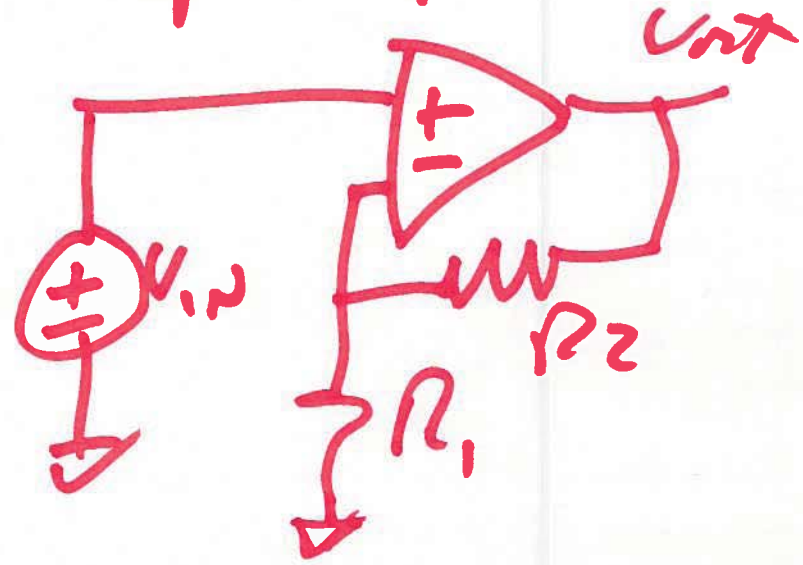
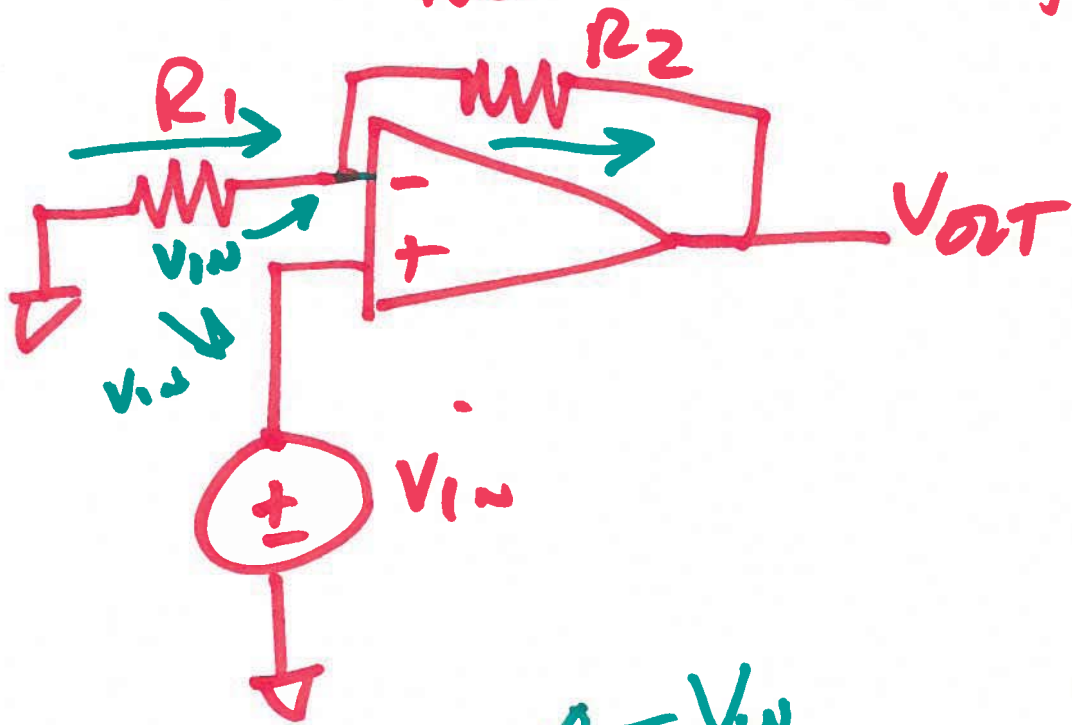


$$\frac{V_I - 0}{R_I} = \frac{0 - V_{OUT}}{R_F}$$

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

v)

NON-INVERTING op-AMP

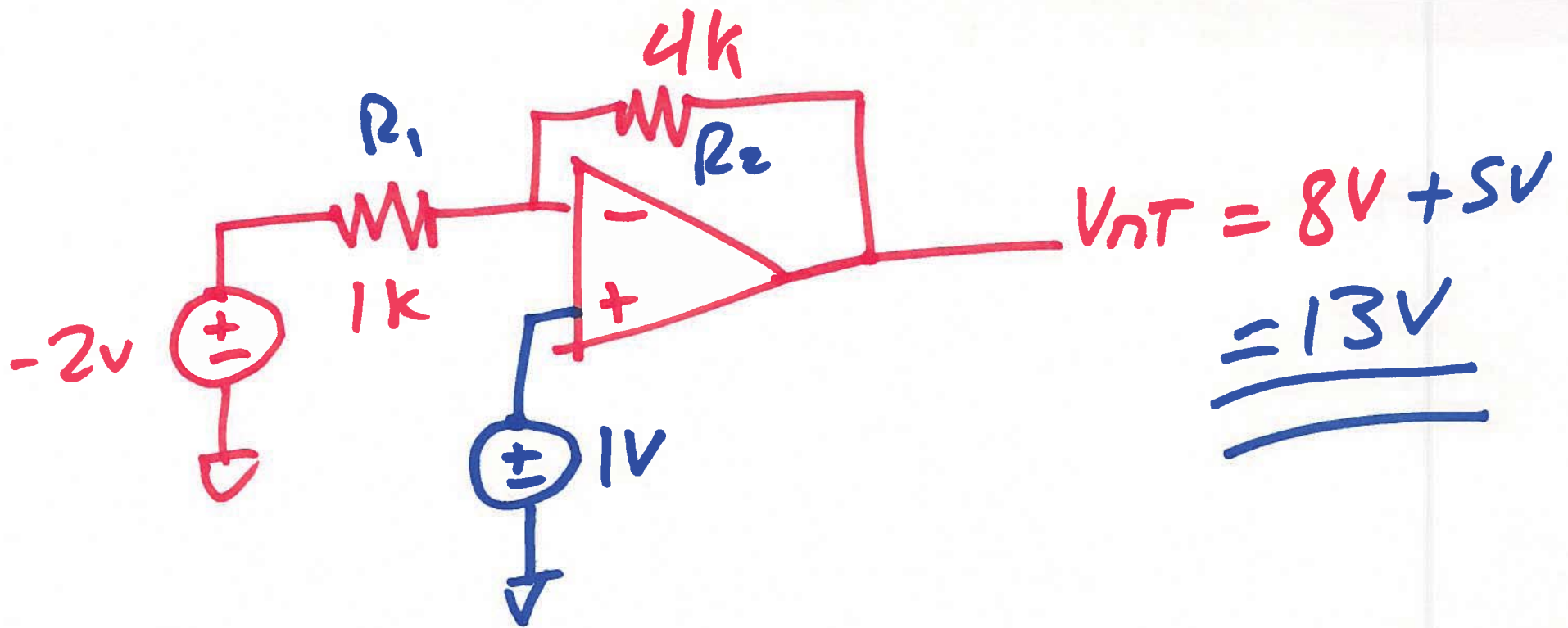


$$0 - V_{in} = \frac{V_{in} - V_{out}}{R_2}$$

$$\frac{V_{out}}{R_2} = V_{in} \left(\frac{1}{R_1} + \frac{1}{R_2} \right)$$

$$\frac{V_{out}}{V_{in}} = 1 + \frac{R_2}{R_1} = \frac{R_1 + R_2}{R_1}$$

1)



8)