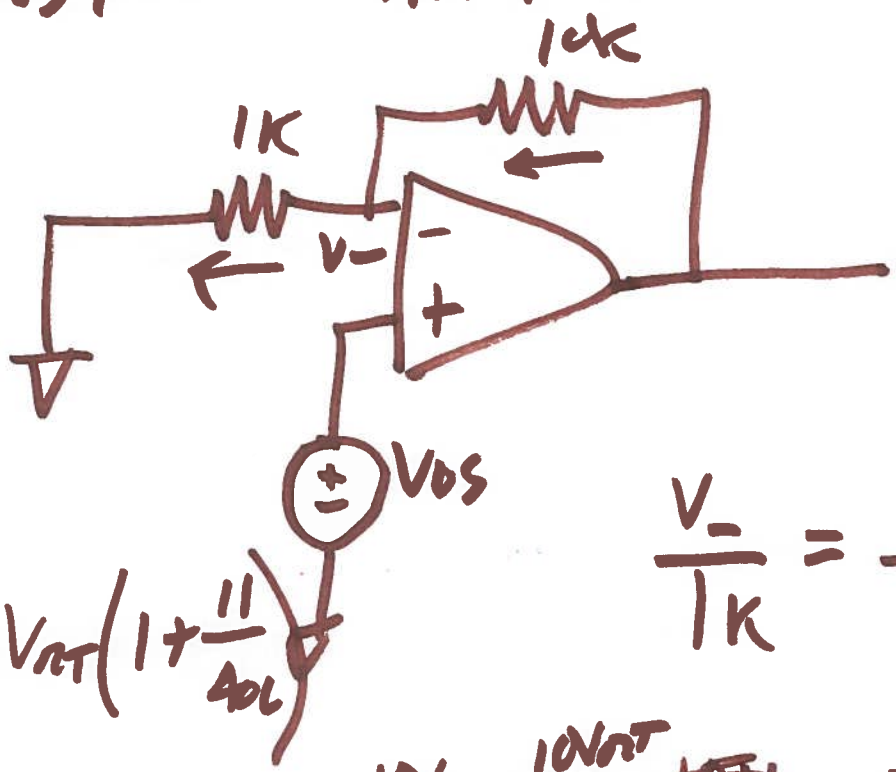
EE 420L

LAB 3

Op-Amps I

$V_{OUT} = V_{OS} \cdot \dfrac{11}{1 + \frac{11}{A_{OL}}}$

$V_{OS} \neq 0 \qquad A_{OL} \neq \infty$



$V_{OUT} = (V_{OS} - V_-) A_{OL}$

$\dfrac{V_{OUT}}{A_{OL}} - V_{OS} = -V_-$

$\dfrac{V_-}{1K} = \dfrac{V_{OUT} - V_-}{10K}$

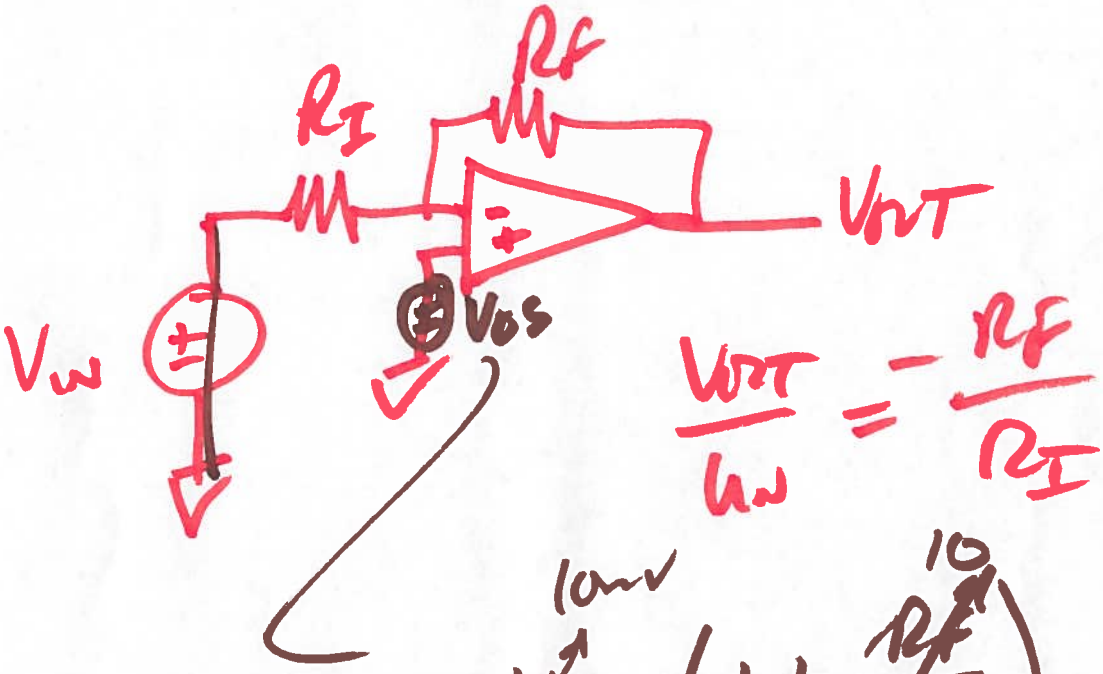
$11V_{OS} = V_{OUT}\left(1 + \dfrac{11}{A_{OL}}\right)$

$10V_{OS} - \dfrac{10V_{OUT}}{A_{OL}} = V_{OUT} + \dfrac{V_{OUT}}{A_{OL}} - V_{OS}$

Quiz 3, EE 420L
Spring 2019
Closed book and notes

Name: _____

1. Sketch the schematic of an inverting op-amp topology. If the gain of this op-amp circuit is −10 what is the op-amp's output voltage if the offset of the op-amp is 10 mV. Assume Vin is 0 V (i.e., grounded) and the non-inverting input of the op-amp is also at ground. Show your work for credit. (10 points).



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

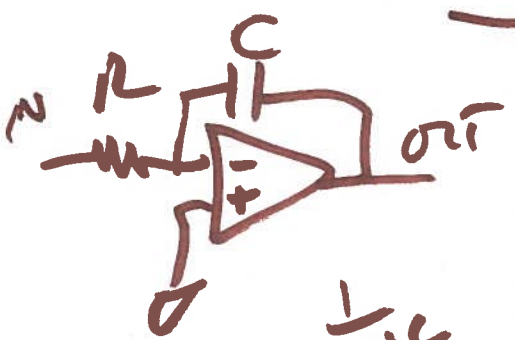
$$V_{OUT} = V_{OS} \cdot \left(1 + \frac{R_F}{R_I}\right)$$

10mV, 10

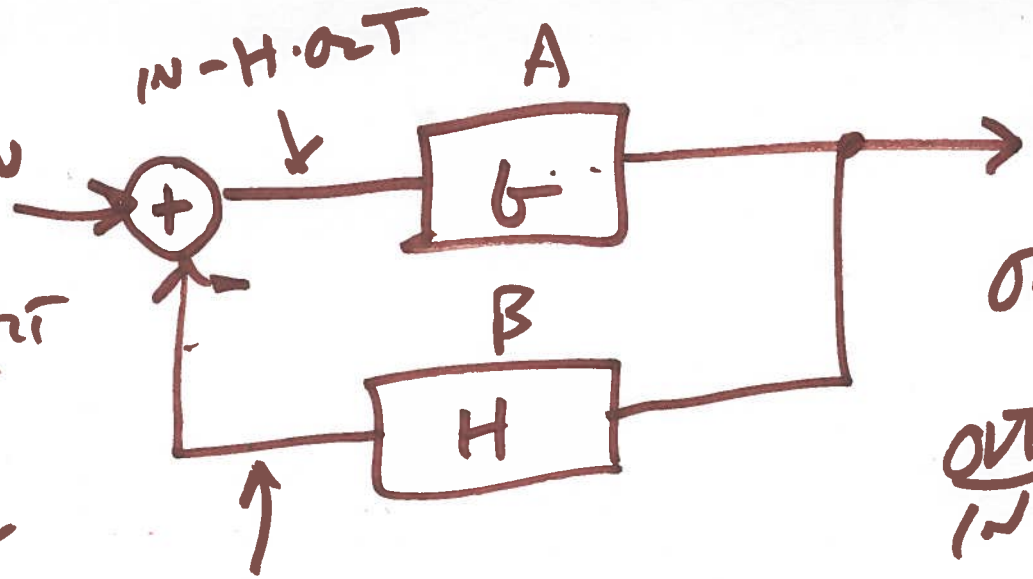
$$V_{OUT} = 110\,mV$$

2)

$\int_0^{\infty} K \cdot dt \Rightarrow \infty$



$\frac{OUT}{IN} = \frac{\frac{1}{j\omega C}}{R}$

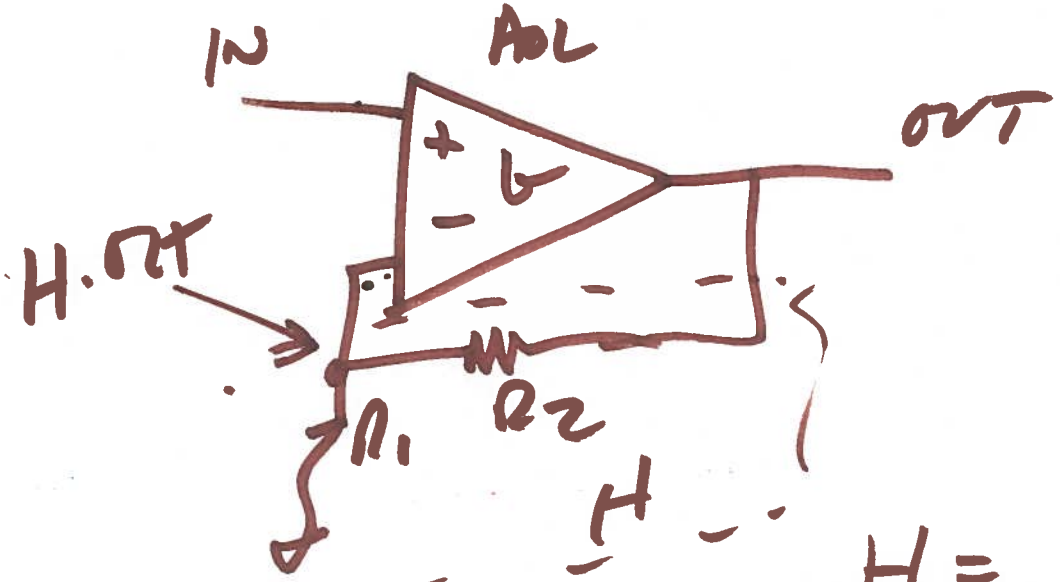


$OUT = G(IN - OUT \cdot H)$

$OUT(1 + GH) = IN \cdot G$

$\frac{OUT}{IN} = \frac{G}{1+GH}$

$= \frac{1}{\frac{1}{G} + H}$

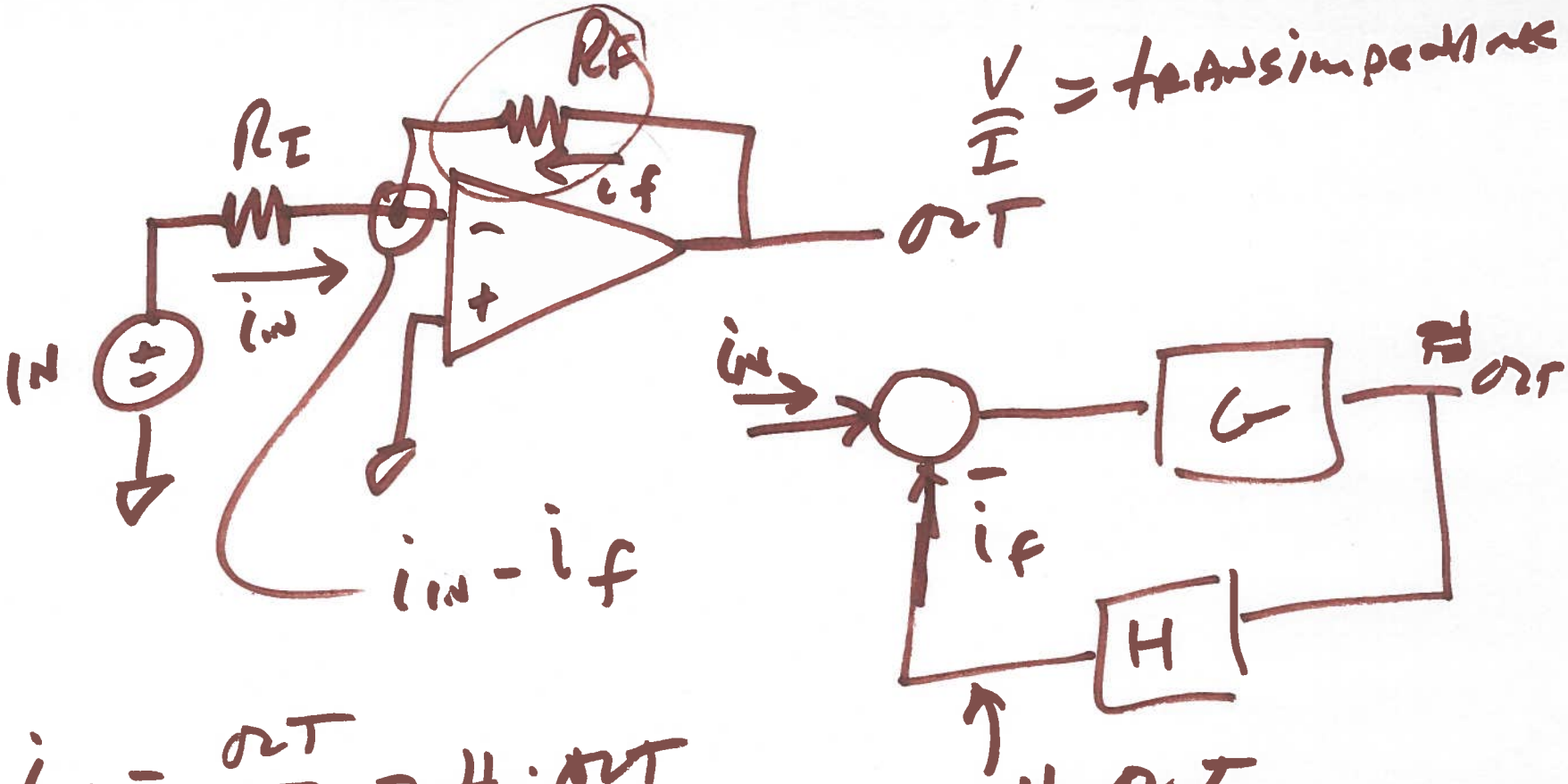


$\frac{OUT}{IN} = \lim_{G \to \infty} \frac{1}{\frac{1}{G} + H} = \frac{1}{H}$

$H = \frac{R_1}{R_1 + R_2}$

$\frac{OUT}{IN} = \frac{R_1 + R_2}{R_1}$

$= 1 + \frac{R_2}{R_1}$



$\frac{V}{I}$ = transimpedance

$i_f = \frac{OUT}{RF} = H \cdot OUT$

$H = \frac{1}{RF}$

$H = \frac{1}{RF}$

$i_N = \frac{iN}{RI}$

Closed-loop gain $= RF$

GAIN