

EE 311

EXAM 1 (100pts)

Name _____

September 13, 2013

ID _____

(20pts) 1)

a) For an ideal transconductance amplifier, you would like the input impedance to be (high, low)? (2pts)

b) For an ideal current amplifier, you would like the output impedance to be (high, low)? (2pts)

c) The output voltage amplitude of a non-inverting amplifier is 10V for a sine wave input at dc. What is the output voltage at $f = \sqrt{3} f_{3dB}$?

$v_0 =$ _____ (5pts)

d) What is the magnitude of the gain of an open-loop amplifier at $f = f_T$?

$|A| =$ _____ (2pts)

e) To increase f_{3dB} of an inverting amplifier, the closed-loop gain must (increase, decrease)? (4pts)

f) To avoid distortion, what is the maximum allowable radian frequency ω_M , of a sine wave at the amplifier output, given by $v_0 = 10 \sin \omega t$, if the op-amp has a slew rate, $SR = 0.5 V/\mu sec$?

$\omega_M =$ _____ (5pts)

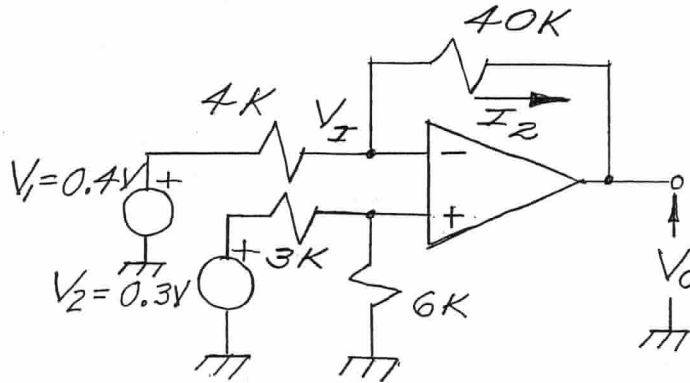
EE 311

EXAM 1 (100pts)

Name _____

September 13, 2013

ID _____



(20pts) 2)

- a. For an ideal op-amp in the circuit shown, determine V_1 , I_2 and V_0 if $V_1 = 0.4V$ and $V_2 = 0.3V$

$V_1 =$ _____ (3pts)

$I_2 =$ _____ (5pts)

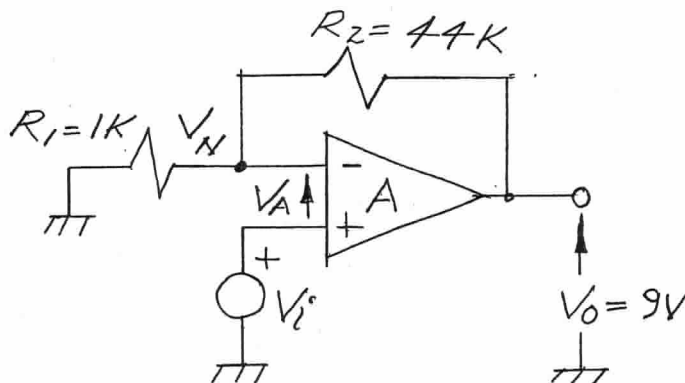
$V_0 =$ _____ (6pts)

- b. What is the input resistance, R_{iN} , seen by V_2 when $V_1 = 0$?

$V_2 : R_{iN} =$ _____ (3pts)

- c. What is the input resistance, R_{iN} , seen by V_1 when $V_2 = 0$?

$V_1 : R_{iN} =$ _____ (3pts)



(20pts) 3. For the circuit above, determine the voltages when:

$A \rightarrow \infty$

$A = 90$

$V_A =$ _____ (2pts)

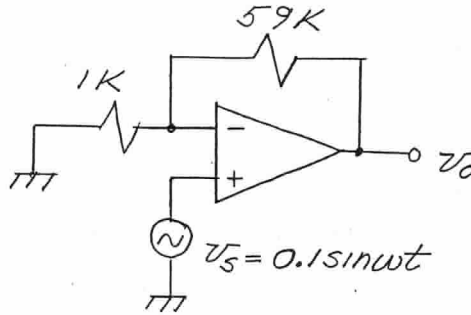
$V_A =$ _____ (3pts)

$V_N =$ _____ (2pts)

$V_N =$ _____ (5pts)

$V_i =$ _____ (3pts)

$V_i =$ _____ (5pts)



(20pts) 4. For the op-amp in the circuit above, $f_T = 1.2 \text{ MHz}$ and $A_0 = 200,000$. Determine:

a. The 3dB frequency for the open-loop op-amp, f_b , and for the circuit, f_{3dB} .

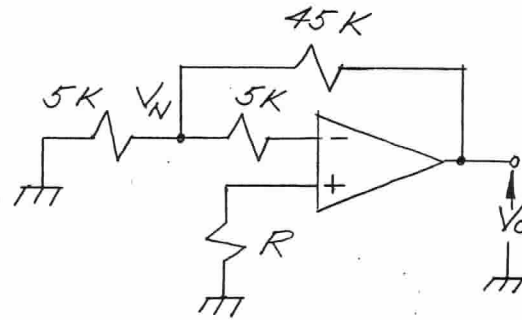
$f_b = \underline{\hspace{2cm}}$ (4pts)

$f_{3dB} = \underline{\hspace{2cm}}$ (6pts)

b. At $f = 240 \text{ KHz}$, estimate the value of the open loop gain $|A|$, and of the circuit gain, $|G|$.

$|A| = \underline{\hspace{2cm}}$ (5pts)

$|G| = \underline{\hspace{2cm}}$ (5pts)



- (20pts) 5. The op-amp is ideal except that it has bias currents of $100nA$ directed into the amplifier. R is chosen to make $V_O = 0$. What are the values of V_N and R ?

$V_N =$ _____ (10pts)

$R =$ _____ (10pts)