Course: Analog Integrated Circuit   Sheet 1:
Instructor: Prof. M. El-Banna   Electronics Section
Term: Winter 2003   Time: SAT 12:00-2:00pm

1. What is the minimum number of terminals required by a single op amp? What is the minimum number of terminals required on an IC package containing four op amps (called a quad op amp)?

2. The circuit shown below uses op amp that is ideal except for having a finite gain A. Measurements indicate that $v_O=3.5V$ when $v_I =3.5V$. What is the op amp gain?
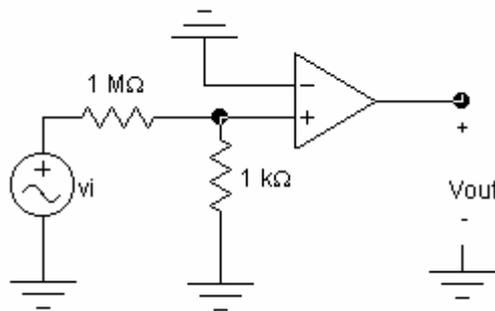
3. An inverting amplifier uses an ideal op amp with $R_1=33k\Omega$ and $R_2=330k\Omega$. What is the closed-loop gain you would expect? A second resistor is connected at the input:
   a- in series with the existing $33k\Omega$.
   b- in parallel with the existing $33k\Omega$
   c- What values of gain result?

4. Assuming ideal op amps, find the voltage gain v_O/v_I and input R_{in} in each of the circuit below:

vi   10 kΩ   100 kΩ   vo

(a)

100 kΩ

vi   10 kΩ   vo

10 kΩ

(b)

100 kΩ

vi   10 kΩ   vo

10 kΩ

(c)

100 kΩ

vi   10 kΩ   vo

10 kΩ

(d)

vi   10 kΩ   vo

(e)

100 kΩ

vi   vo

(f)