EECS 210 Fall 00
Homework #6
Due(in class) Friday 10/27/00

(The numbered problems are from your textbook).

1. Problem 5.2
   Also repeat this problem when the power supply voltage is increased to $\pm$15 V.

2. Problem 5.3

3. Problem 5.4

4. Problem 5.15

5. Lab Homework Problem(Assigned by A. Ganago)

> Please do this problem early in the week, before you go to Lab Lecture 4. Bring your solution to the Lab Lecture. You will need the your solution of this problem for successful work during Lab lecture experiments.

In Lab Lecture 4 experiments you will build three circuits:

- an inverting amplifier (as shown in Figure 5.9 of your textbook),
- a non-inverting amplifier (similar to that shown in Figure 5.12 of your textbook), and
- a voltage follower (similar to that shown in Figure P5.20 with Problem 5.20 of your textbook).

For the two amplifier circuits you will use an input resistor R_s = 2.4 kΩ and a feedback resistor R_f = 100 kΩ.

Recall that the actual resistor value can deviate from its nominal value by as much as 10%. For each of the amplifier circuits calculate the magnitude of voltage gain $|G| = v_o/v_s$ for nominal values of resistors, as well as the lowest expected gain and the highest expected gain for resistors with 10% tolerance.

The voltages from the power supply equal to +12 V and –12 V; thus clipping may occur at +10 V and –10 V.* Consider an input waveform which is a sum of a sine wave 200 mV peak-to-peak and a DC offset. That is, in mV,

$$V_{in} = DC + 100 * \sin(\omega t),$$

where DC is a constant.

Is the output signal clipped in the inverting amplifier if DC offset is zero? Determine the maximal magnitude of the DC offset at which the output signal is not clipped for nominal, minimal, and maximal gain of the inverting amplifier. Consider both positive and negative DC offset.

*Note: In class we assumed that the amplifier does not saturate until the output voltage either exceed V_{CC}^{+} or is less than V_{CC}^{+} . In actual Op-Amps saturation may occur when the output voltage gets within 2 V of V_{CC}^{+} or V_{CC}^{+}.