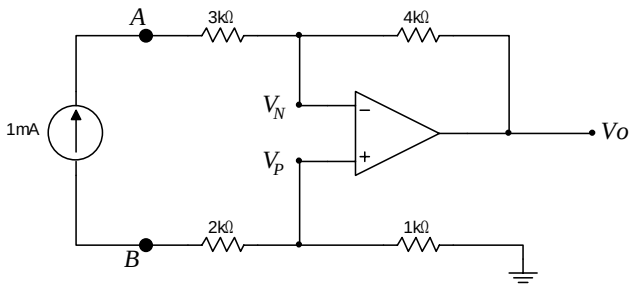
Massachusetts institute of Technology
Department of Nuclear Science and Engineering
Department of Electrical Engineering and Computer Science

22.071/6.071 - Introduction to Electronics, Signals and Measurement
Spring 2006

Homework 10
Due 5/3/06

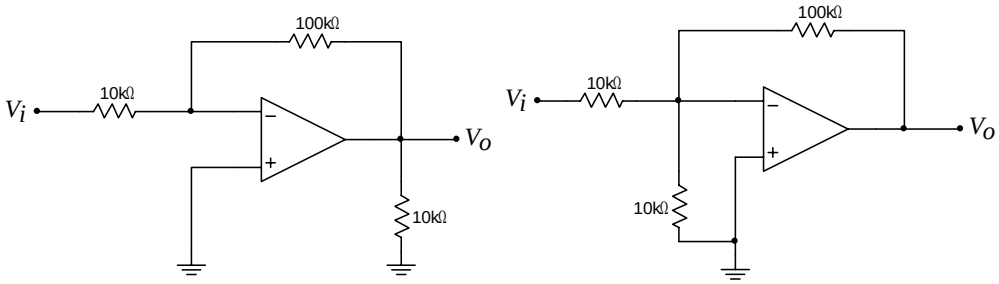
Problem 1.

For the following circuit:
Calculate the voltages V_N, V_P and Vo



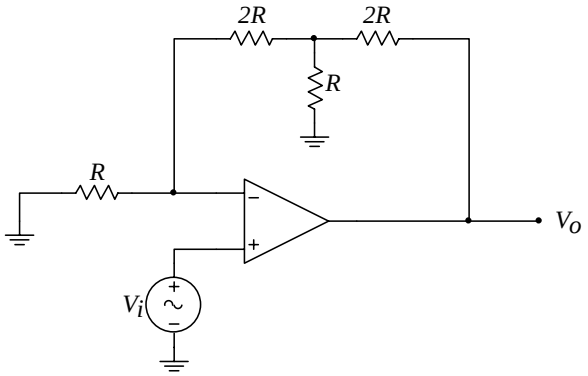
Problem 2.

For these circuits calculate the gain and the input resistance seen by the input signal *Vi*.
Assume ideal op-amps.



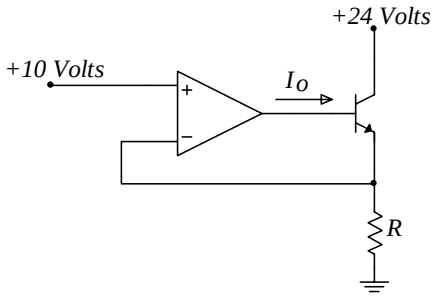
Problem 3.

Calculate the gain $A = \frac{Vo}{Vi}$ for the following ideal op-amp circuit



Problem 4.

The op-amp in the following circuit outputs a current of 5 mA. (Io=5 mA). The transistor has β=100. Calculate the value of the resistor R.



Problem 5.

The following circuit is a high pass filter.

1. Derive the voltage transfer function Vo/Vi
2. What is the voltage gain at low and at high frequencies?
3. At what frequency is the magnitude of the gain $1/\sqrt{2}$ of the maximum value?