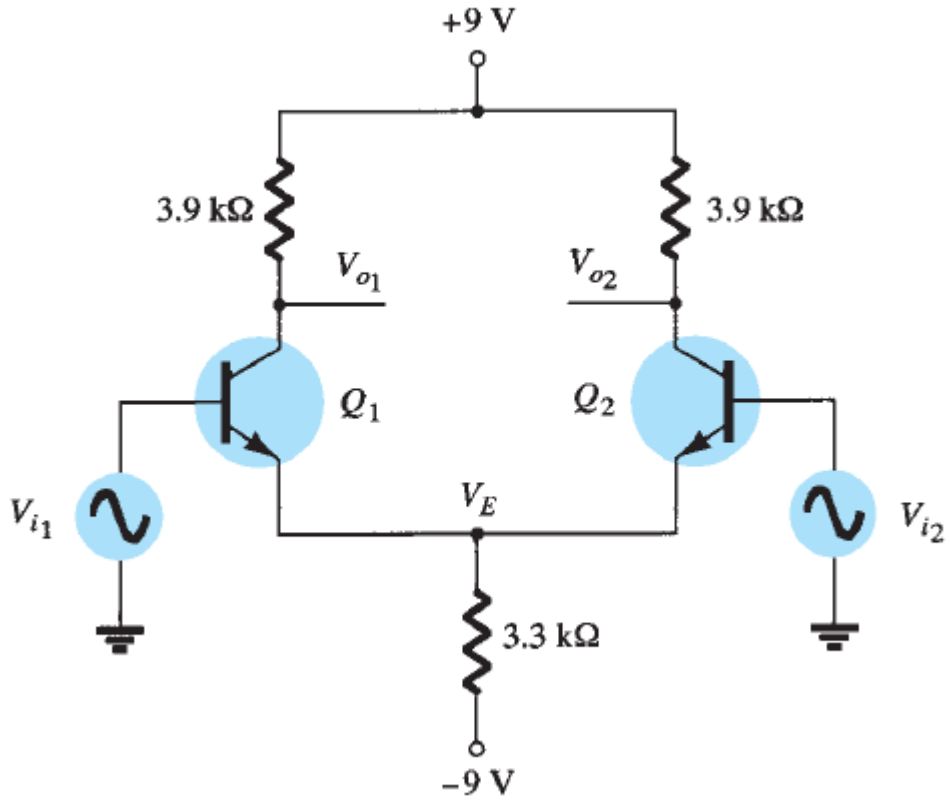
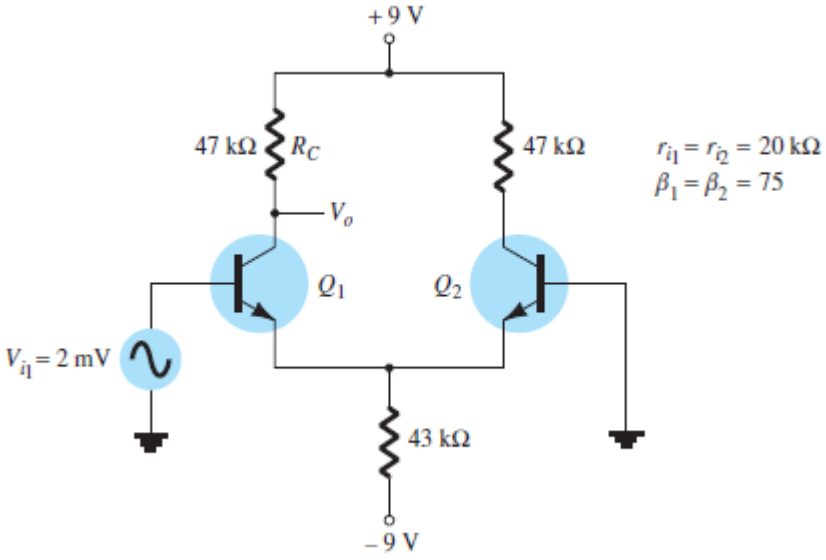
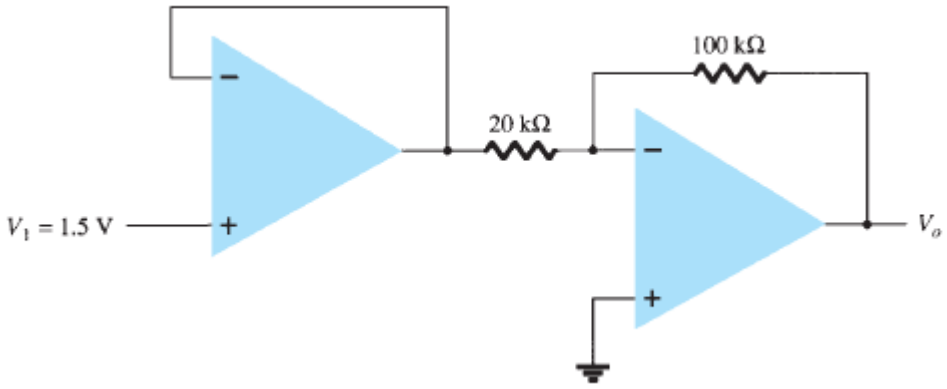
1. Calculate the dc voltages and currents in the circuit and draw the small signal hybrid equivalent model



2. Calculate the single-ended output voltage V_{o1} for the circuit and calculate the differential and common mode gain and the CMRR



3. Calculate the output voltage of the circuit



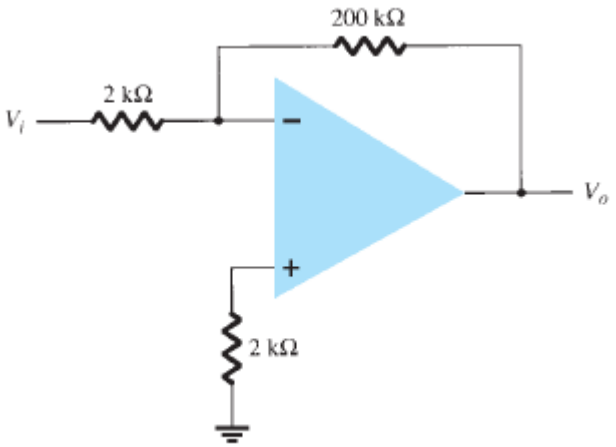
4. For an op-amp having a slew rate of SR = 2.4 V>ms, what is the maximum closed-loop voltage gain that can be used when the input signal varies by 0.3 V in 10 ms?

5. For an input of V_1 = 50 mV in the circuit, determine the maximum frequency that may be used. The op-amp slew rate SR _ 0.4 V>ms.

6. Using the specifications listed in the table below , calculate the typical offset voltage for the circuit below

μA741 Electrical Characteristics: $V_{CC} = \pm 15$ V, $T_A = 25°C$

Characteristic	Minimum	Typical	Maximum	Unit
V_{IO} Input offset voltage		1	6	mV
I_{IO} Input offset current		20	200	nA
I_{IB} Input bias current		80	500	nA
V_{ICR} Common-mode input voltage range	±12	±13		V
V_{OM} Maximum peak output voltage swing	±12	±14		V
A_{VD} Large-signal differential voltage amplification	20	200		V/mV
r_i Input resistance	0.3	2		MΩ
r_o Output resistance		75		Ω
C_i Input capacitance		1.4		pF
CMRR Common-mode rejection ratio	70	90		dB
I_{CC} Supply current		1.7	2.8	mA
P_D Total power dissipation		50	85	mW



7. For the typical characteristics of the 741 op-amp, calculate the following values for the circuit above
   a. A_{CL} .
   b. Z_i .
   c. Z_o .