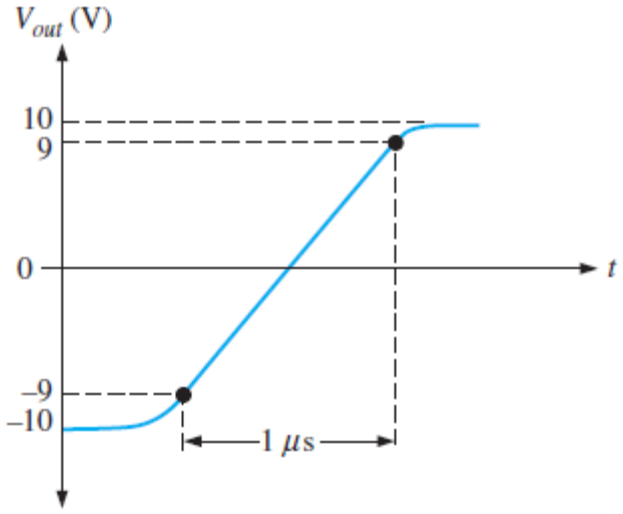
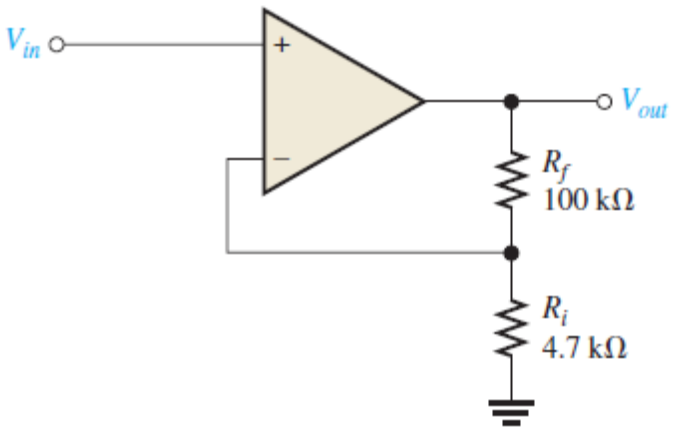
Faculty of engineering at shoubra **Communication department** **ECE-322: Electronic Circuits (B)**		**Dr. Ahmad El-Banna** **Semester : Spring 2017** **Sheet :2** **Operational Amplifiers**

1. A certain op-amp has an open-loop differential voltage gain of 100,000 and a common-mode gain of 0.2. Determine the CMRR and express it in decibels.

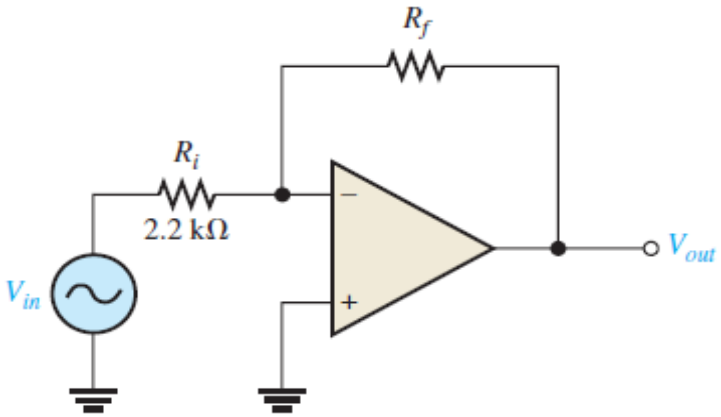
2. The output voltage of a certain op-amp appears as shown in Figure in response to a step input. Determine the slew rate.



3. Determine the closed-loop voltage gain of the amplifier in Figure

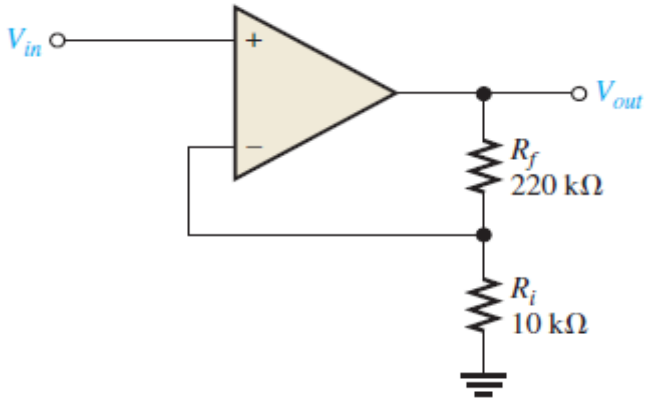


4. Given the op-amp configuration in Figure, determine the value of R_f required to produce a closed-loop voltage gain of -100.



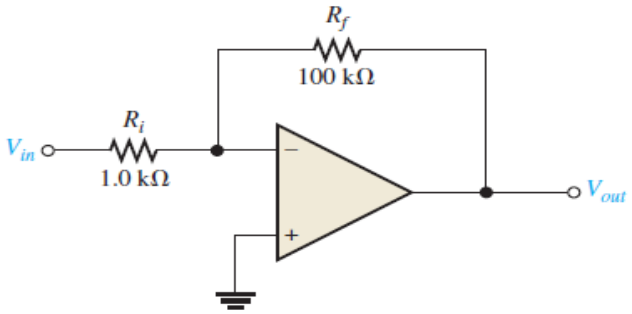
5. Design an operational amplifier circuit with gain equals:
a)12 b) -12

6. Determine the input and output impedances of the amplifier in Figure The op-amp datasheet gives Z_{in} = 2MΩ, Z_{out} = 75Ω, and A_{ol} = 200,000. and then Find the closed-loop voltage gain.



7. The op-amp in problem 6 is used in a voltage-follower configuration. Determine the input and output impedances.

8. Find the values of the input and output impedances in Figure. Also, determine the closed-loop voltage gain. The op-amp has the following parameters: A_{ol} = 50,000; Z_{in} = 4MΩ; and Z_{out} = 50Ω.

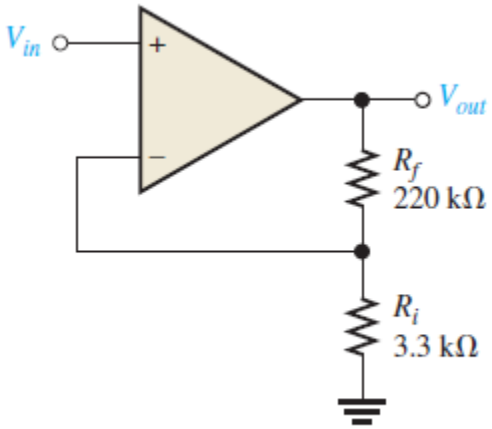


9. Design an operational amplifier circuit with the following specifications:
(Two stages ,Total gain =30 dB, Z_i =100KΩ, Z_o = 1Ω)
The op-amp has the following parameters: A_{ol} = 50,000 and Z_{out} = 5KΩ.

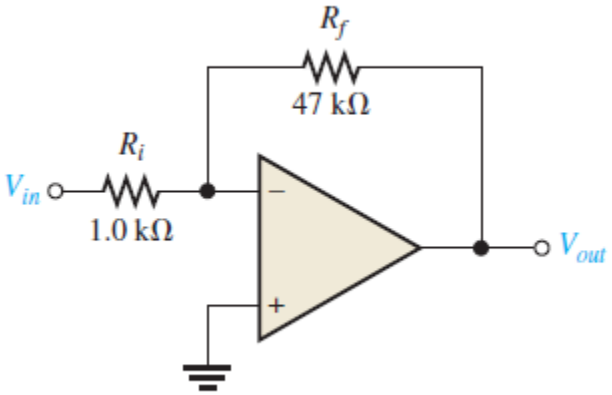
10. A certain op-amp has three internal amplifier stages with the following gains and critical frequencies:
Stage 1: A_{v1}= 40 dB, f_{c1} =2 kHz
Stage 2: A_{v2}= 32 dB, f_{c2} =40 kHz
Stage 3: A_{v3}= 20 dB, f_{c3} =150 kHz
Determine the open-loop midrange gain in decibels and the total phase lag when f = f_{c1}.

11. A certain amplifier has an open-loop midrange gain of 150,000 and an open-loop 3 dB bandwidth of 200 Hz. The attenuation (B) of the feedback loop is 0.002. What is the closed-loop bandwidth?

12. Determine the bandwidth of each of the amplifiers in Figure. Both op-amps have an open-loop gain of 100 dB and a unity-gain bandwidth (f_T) of 3 MHz.



(a)



(b)