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Tutorial 1
DKT214 – Electronic Circuits; Semester 1 2017/2018

1. Compare a practical op-amp to an ideal op-amp.
2. Two IC op-amps are available to you. Their characteristics are listed below. Choose the one you think is more desirable.

   Op-amp 1: Z_{in} = 5 MΩ, Z_{out} = 100Ω, A_{ol} = 50,000

   Op-amp 2: Z_{in} = 10 MΩ, Z_{out} = 75Ω, A_{ol} = 150,000
3. Identify the type of input mode for each op-amp in Figure 1.1.
4. A certain op-amp has a CMRR of 250,000. Convert this to decibels.
5. The open-loop gain of a certain op-amp is 175,000. Its common-mode gain is 0.18. Determine the CMRR in decibels.
6. An op-amp datasheet specifies a CMRR of 300,000 and an A_{ol} of 90,000. What is the common-mode gain?
7. Determine the bias current, I_{BIAS}, given that the input currents to an op-amp are 8.3 uA and 7.9 uA.
8. Figure 1.2 shows the output voltage of an op-amp in response to a step input. What is the slew rate?
9. How long does it take the output voltage of an op-amp to go from -10 V to +10 V if the slew rate is 0.5 V/uS?
10. Identify each of the op-amp configurations in Figure 1.3.
11. A noninverting amplifier has an R_i of 1.0 kΩ and an R_f of 100 kΩ. Determine V_f and B if V_{out} = 5 V.
12. For the amplifier in Figure 1.4, determine the following:

    (a) $A_{cl(NI)}$ (b) V_{out} (c) V_f
13. Determine the closed-loop gain of each amplifier in Figure 1.5.
14. Find the gain of each amplifier in Figure 1.6.
15. Determine the approximate values for each of the following quantities in Figure 1.7.

    (a) I_{in} (b) I_f (c) V_{out} (d) closed-loop gain
16. Determine the input and output impedances for each amplifier configuration in Figure 1.8.

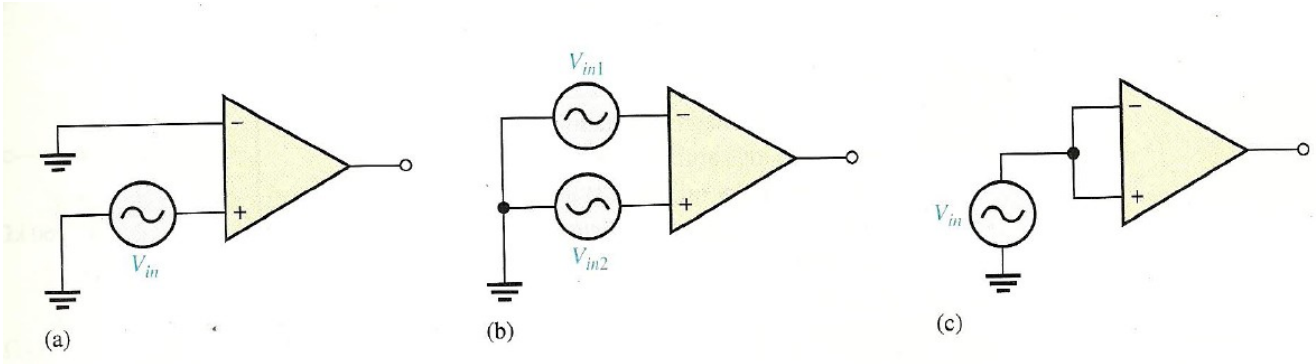

Figure 1.1

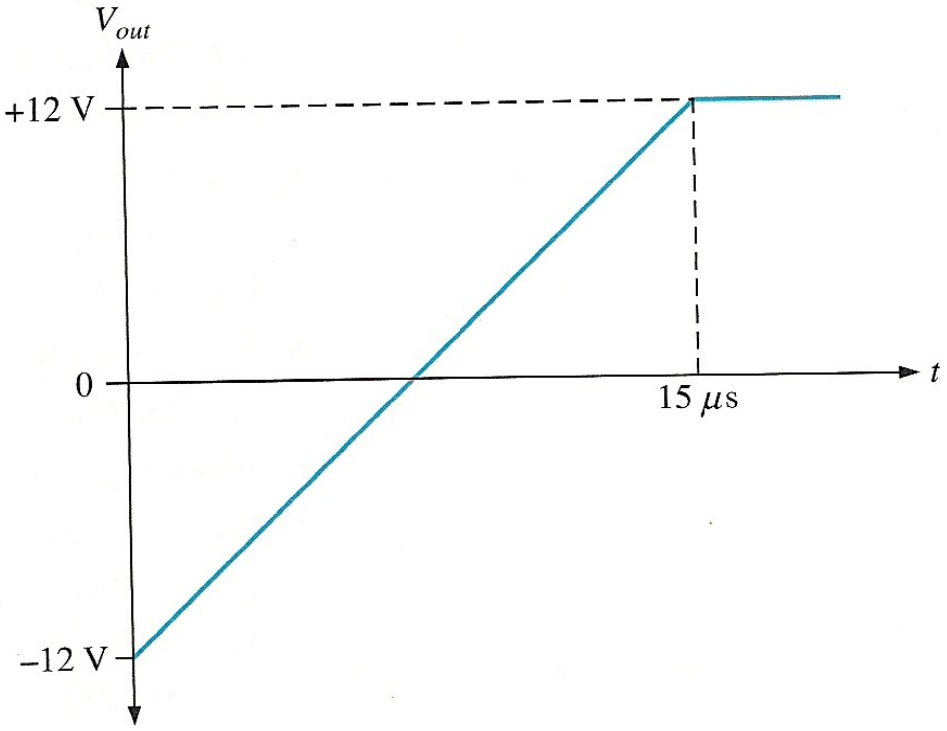

Figure 1.2

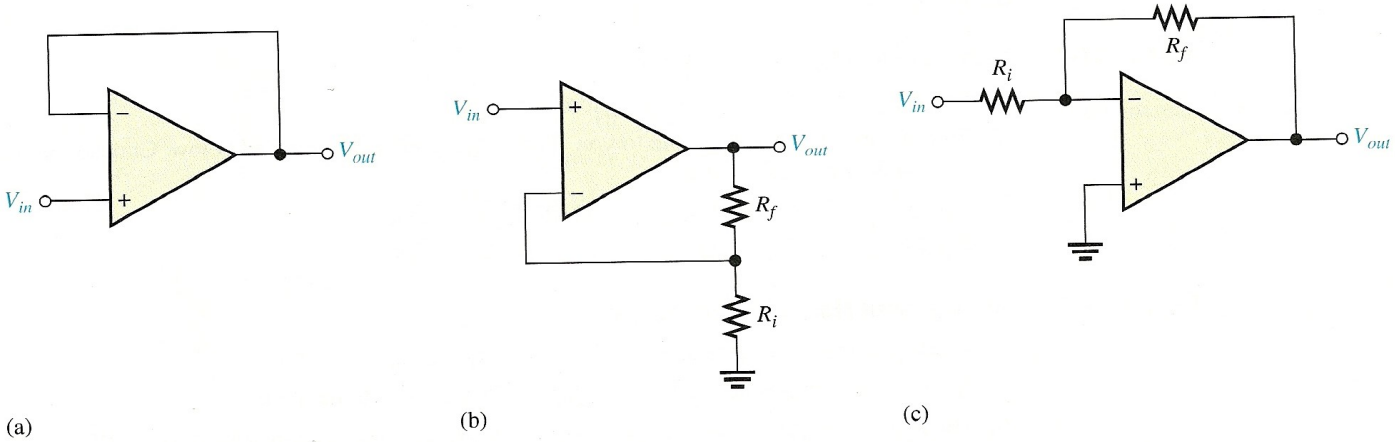

Figure 1.3

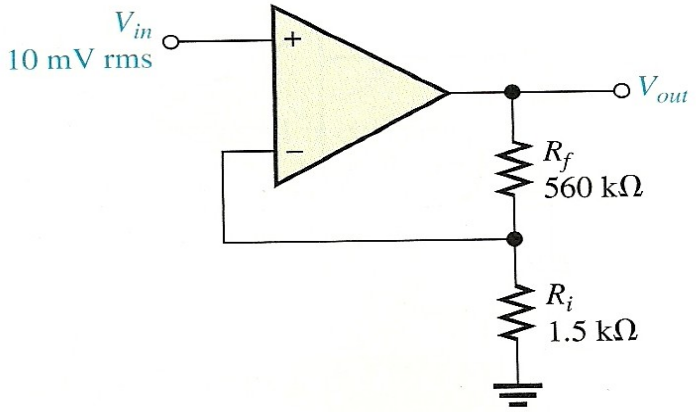

Figure 1.4

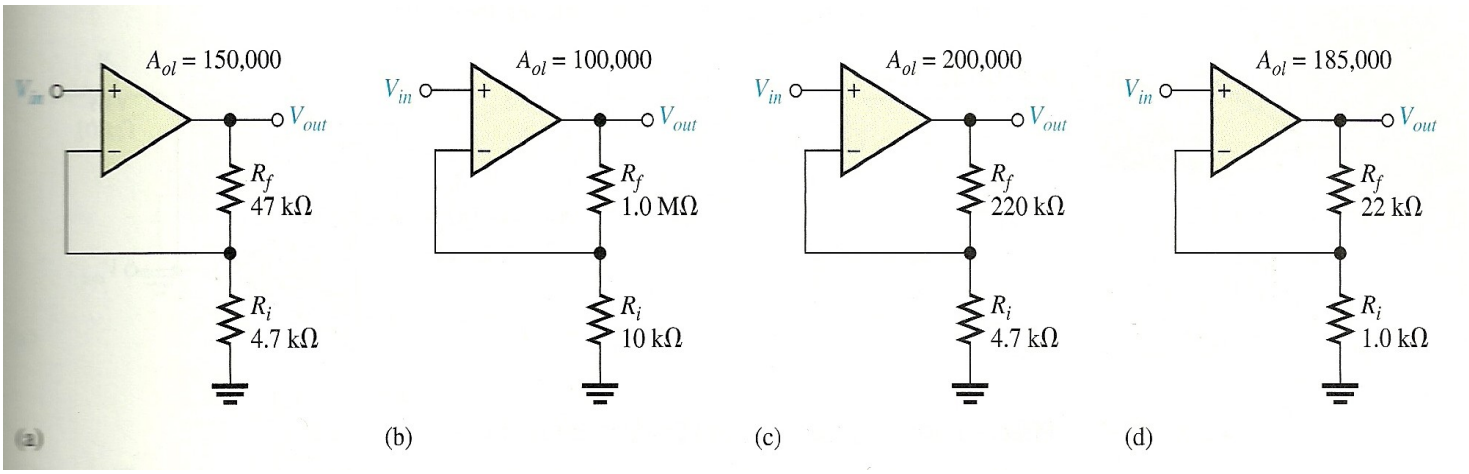

Figure 1.5

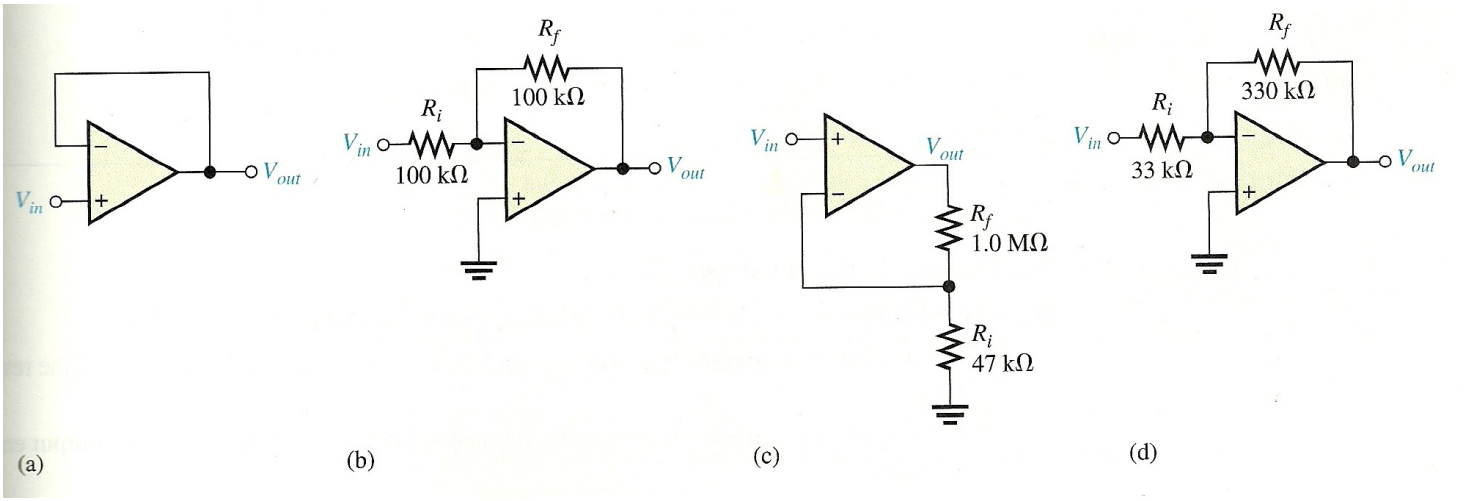

Figure 1.6

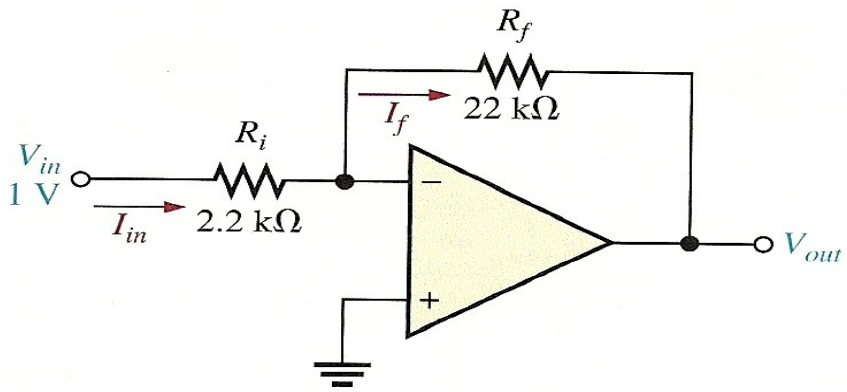

Figure 1.7

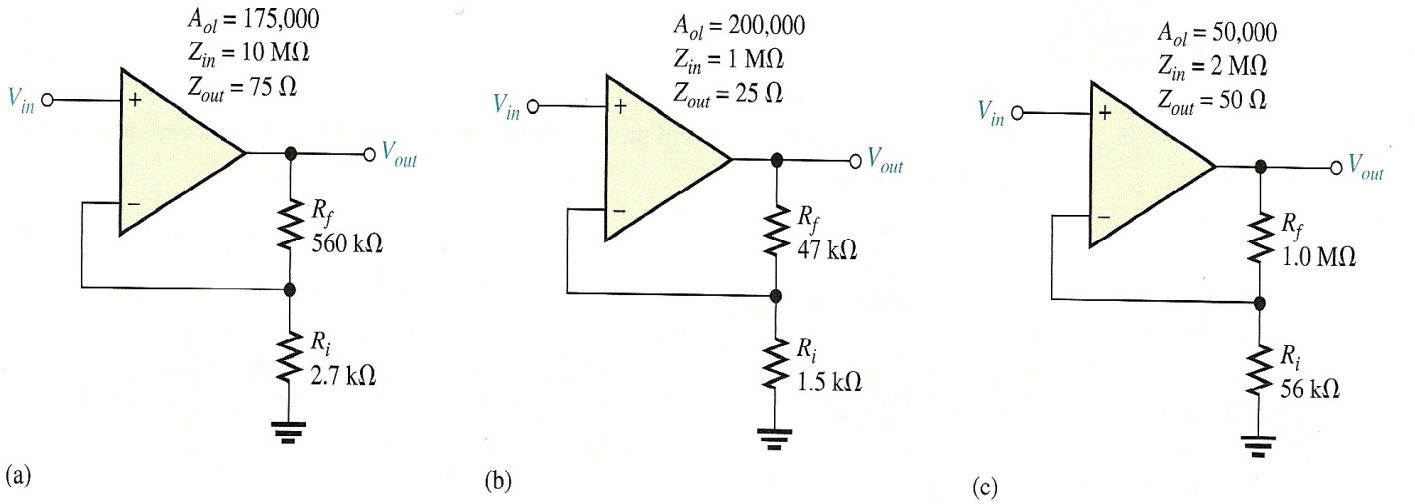

Figure 1.8