

L0-5

To Do The Analysis of Ideal and Practical Operational Amplifier Circuits

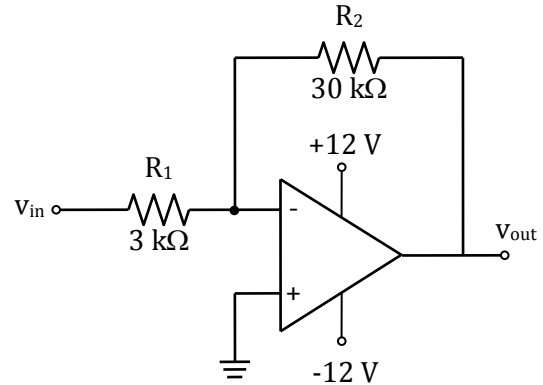
1. Consider the operational amplifier circuit given.

(a) Determine the voltage gain

$$A_V = \frac{v_{out}}{v_{in}}$$

(b) Determine and plot v_{out} when

- $v_{in}(t) = 0.5 \sin 2\pi t$ volt
- $v_{in}(t) = 2 \sin 2\pi t$ volt



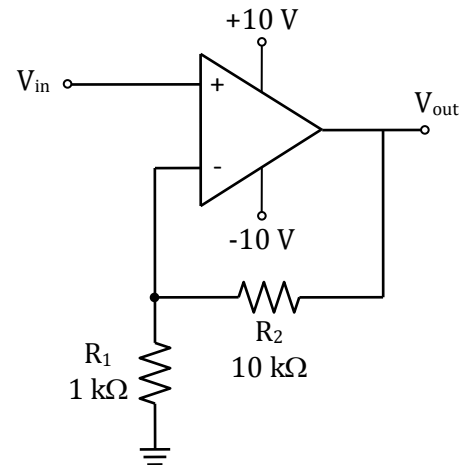
2. Consider the operational amplifier circuit given.

(a) Determine the voltage gain

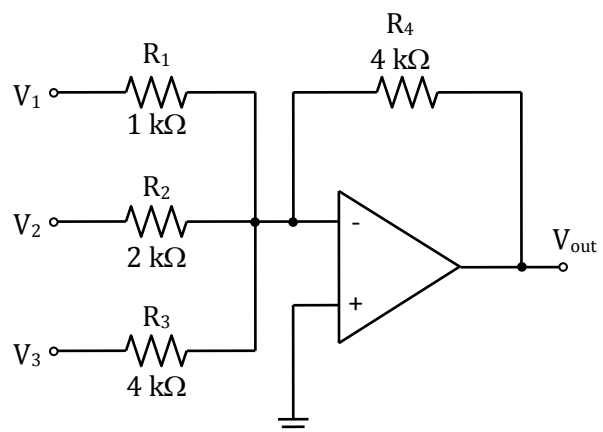
$$A_V = \frac{v_{out}}{v_{in}}$$

(b) Determine and plot v_{out} when

- $v_{in}(t) = 0.5 \sin 2\pi t$ volt
- $v_{in}(t) = 2 \sin 2\pi t$ volt

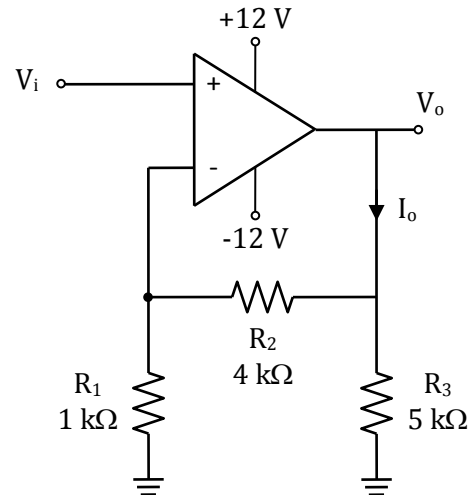


3. Determine the output voltage V_{out} as a function of the inputs in the operational amplifier circuit given.

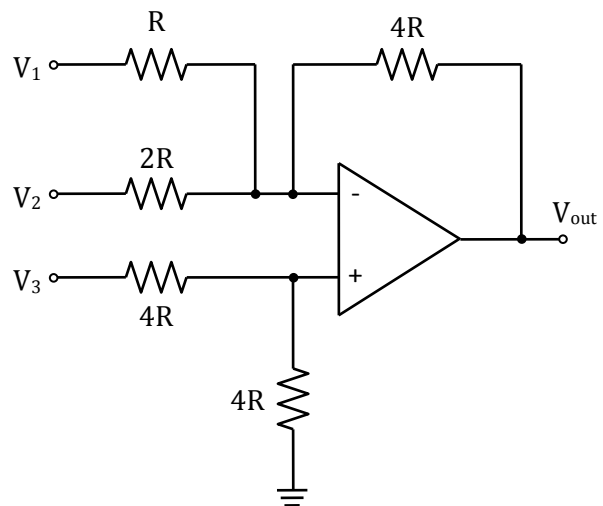


4. Consider the OPAMP circuit given on the right.

- Express the current I_o as a function of the input voltage V_i .
- Determine the voltage range of V_o and the corresponding voltage range of V_i for proper undistorted operation.



5. Determine the output voltage V_{out} for the operational amplifier circuit given.



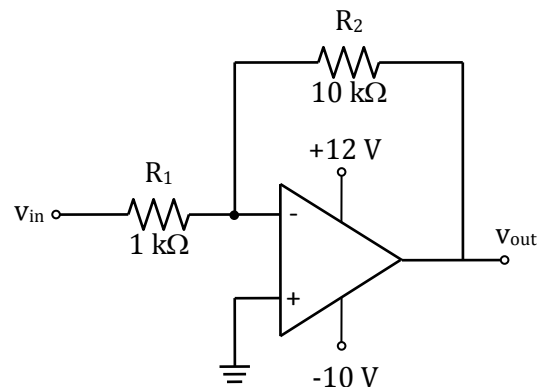
6. Consider the operational amplifier circuit given.

- Determine the voltage gain

$$A_V = \frac{v_{out}}{v_{in}}$$

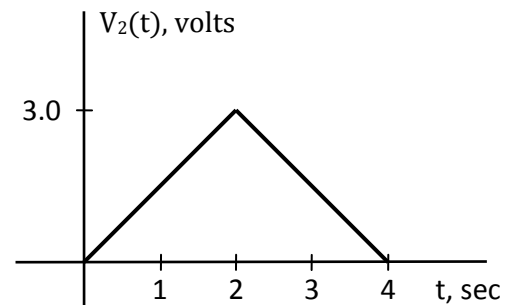
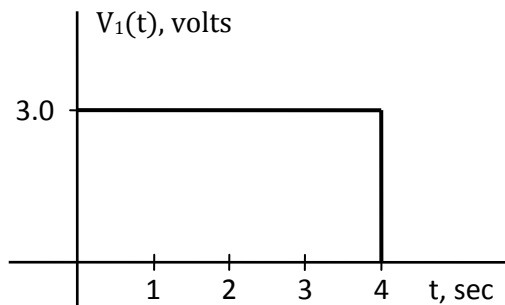
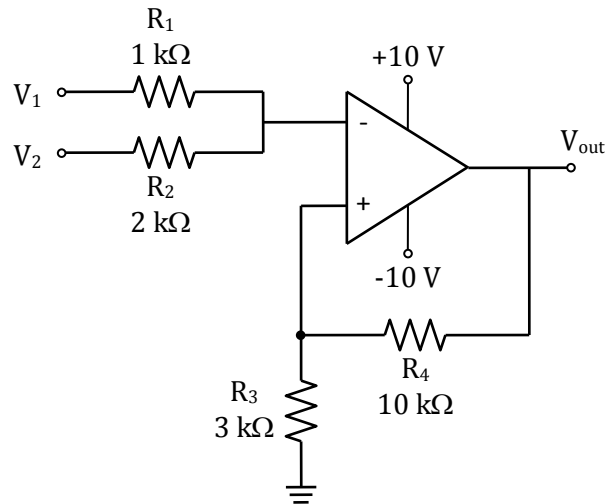
- Determine and plot v_{out} when

$$v_{in}(t) = 2 \sin 2\pi t \text{ volt}$$

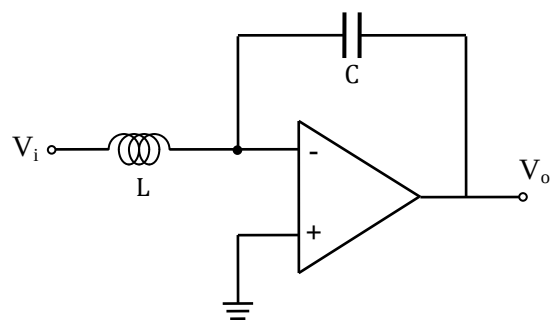
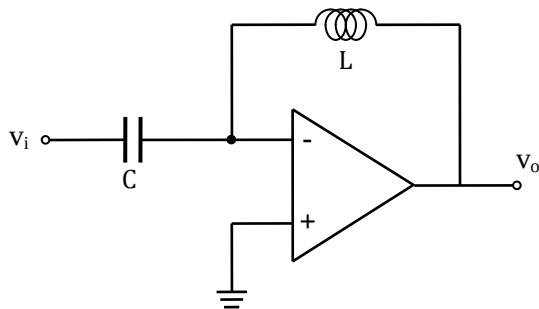


7. Consider the operational amplifier circuit given.

- Determine the output voltage V_{out} in terms of the inputs V_1 and V_2 .
- Determine and plot v_{out} for the following input.



8. Consider the operational amplifier circuits given. Express the output voltage v_o in terms of the input voltage v_i and L and C.



9. Consider the operational amplifier circuit given.

- Obtain the output V_{out} as a function of the inputs V_1 , V_2 and the resistors R_1 , R_2 , R_3 , and R_4 .
- Determine the relationship between the resistors if the output V_{out} is proportional to the difference of the inputs V_1 and V_2 , i.e.,

$$V_{out} = \alpha (V_2 - V_1)$$

- Determine V_{out} when

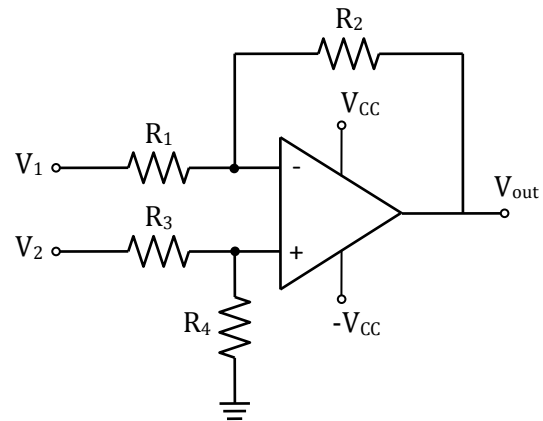
$$R_1 = R_2 = 1 \text{ k}\Omega,$$

$$R_3 = R_4 = 10 \text{ k}\Omega,$$

$$V_1 = \sin \omega_0 t \text{ volt}$$

$$V_2 = 2 \cos \omega_0 t \text{ volt}$$

$$V_{CC} = 5 \text{ V}$$



10. Determine the voltage gain $A_v = V_o / V_i$ for the following OPAMP circuit.

