Basic Circuit Theory (I) 電路學(一)

Dept. of ECE, National Taiwan University of Science and Technology

Homework 2

Due 6:00PM Monday, November 14, 2022

1. (20 pts) (a) Please find V_o in terms of V_1 and V_2 in Fig. 1. (5 pts) (b) If $V_1 = V_2 = 4V$, find V_o (5 pts) (c) If the op-amp power supplies are $\pm 15V$ and $V_2 = 2V$, what is the allowable range of V_1? (10 pts)
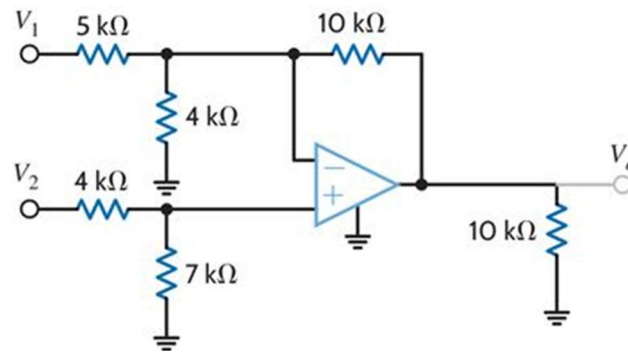

Fig. 1

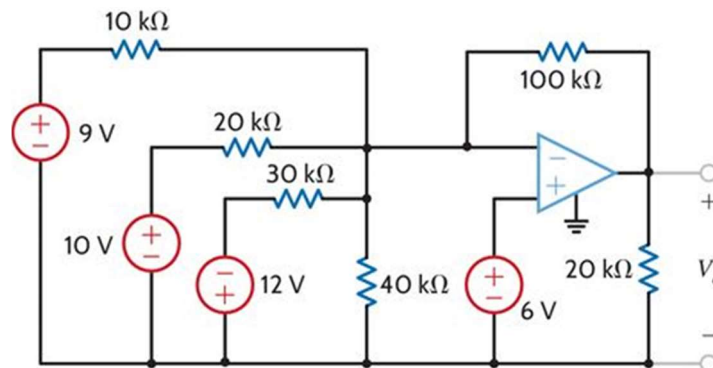2. (10 pts) Please find V_o in the circuit in Fig. 2.

Fig. 2

3. (10 pts) Please show that voltage V_o of the circuit in Fig. 3, is given by

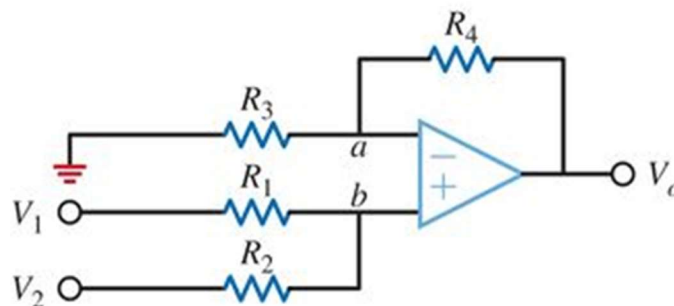$$V_o = \frac{R_3 + R_4}{R_3(R_1 + R_2)}(R_2 V_1 + R_1 V_2)$$

Fig. 3

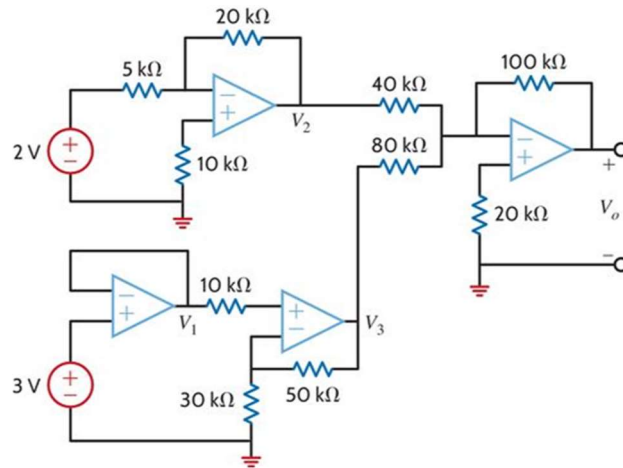4. (10 pts) Please find V_o in the circuit in Fig. 4.

Fig. 4

5. (20 pts) The waveform for the current flowing through a 0.5 H inductor is shown in Fig. 5. Please find:
(a) the energy stored in the inductor at t = 1.7 ms (5 pts), (b) the energy stored in the inductor at t = 4.2 ms (5 pts), and (c) the power absorbed by the inductor at t = 1.2 ms, t = 2.8 ms, and t = 5.3 ms (10 pts).
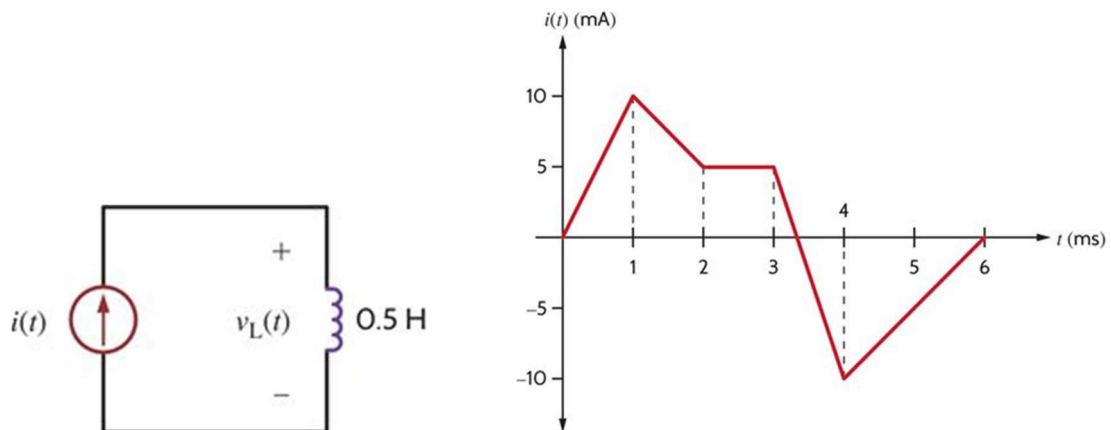

Fig. 5

6. (10 pts) If the input to the circuit shown in Fig. 6(a) is given by the waveform in Fig. 6(b), please find the output waveform $v_o(t)$ if $v_o(0) = 0$.
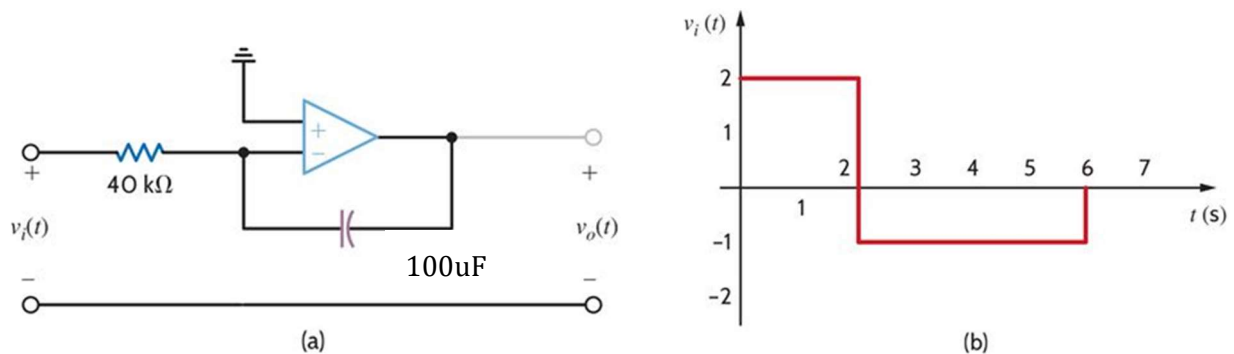

Fig. 6

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7. (20 pts) For the circuit shown in Fig. 7 below, $v_{s1}(t) = 80\cos 324t$ V and $v_{s2}(t) = 40\cos 324t$ V, find $v_o(t)$.
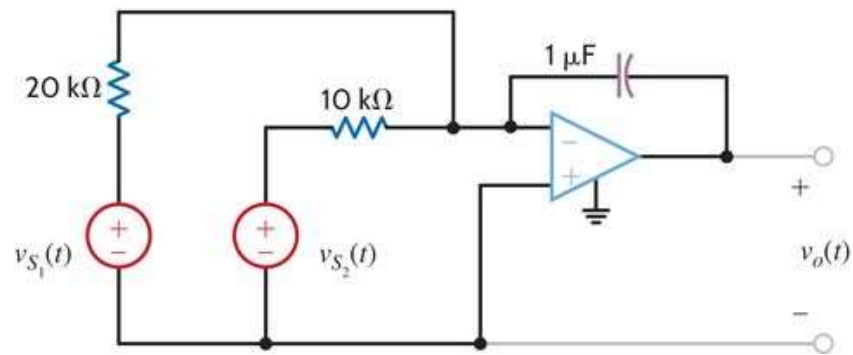

Fig. 7