Homework 3

Due date:
Mar.19th, 2018
Turn in your homework in class

Rules:

- Work on your own. Discussion is permissible, but extremely similar submissions will be judged as plagiarism.
- Please show all intermediate steps: a correct solution without an explanation will get zero credit.
- Please submit on time. No late submission will be accepted.
- Please prepare your submission in English only. No Chinese submission will be accepted.

1. Find the equivalent resistance in the circuit R_{ab} in Fig. 1 by using Y-Δ transformation.

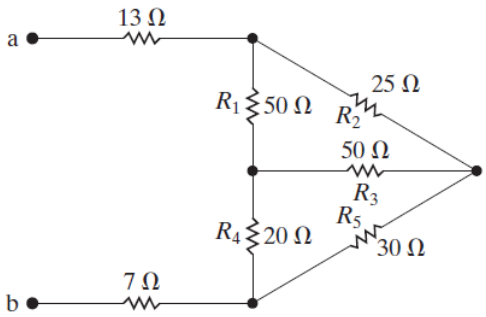


Figure 1

2. For the circuit in Fig. 2, determine the value of R such that the maximum power delivered to the load is 3 mW.

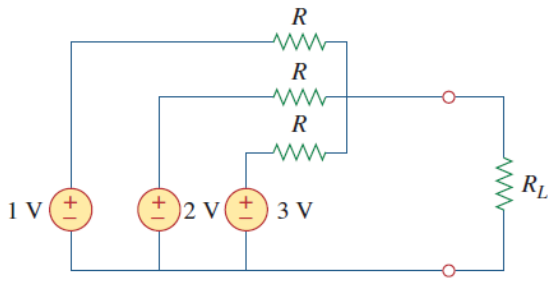
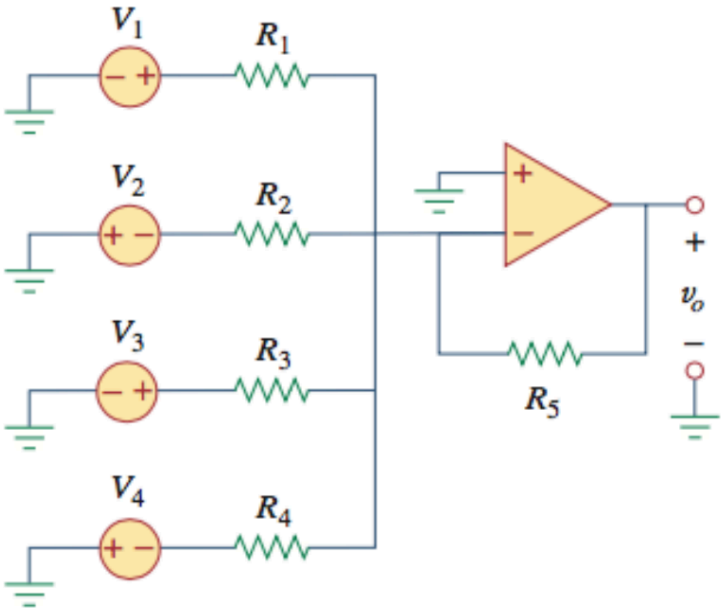
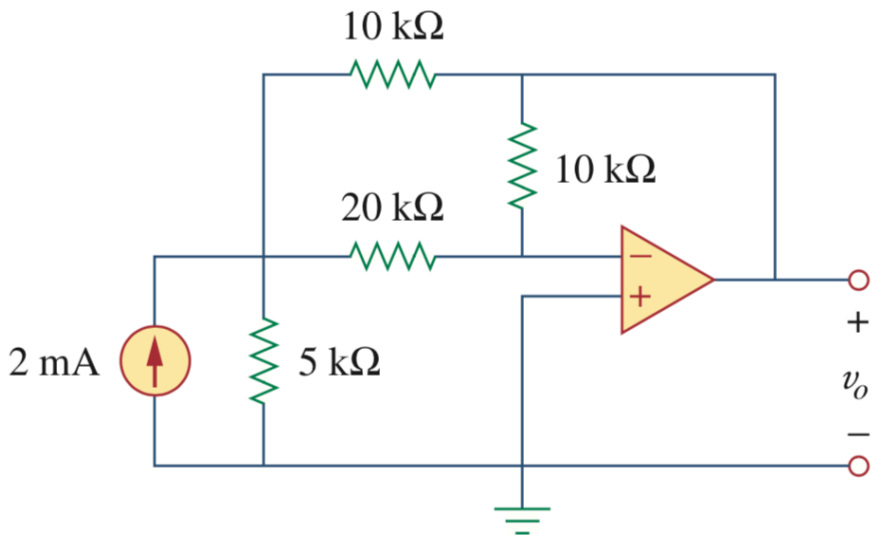


Figure 2

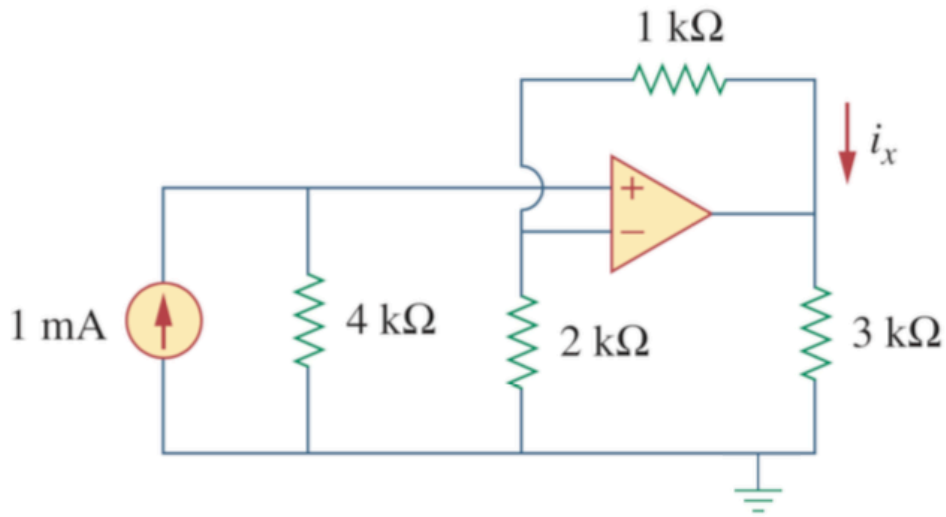
3. Calculate v_0 in this circuit.



4. Determine the output voltage v_0 in the circuit below.

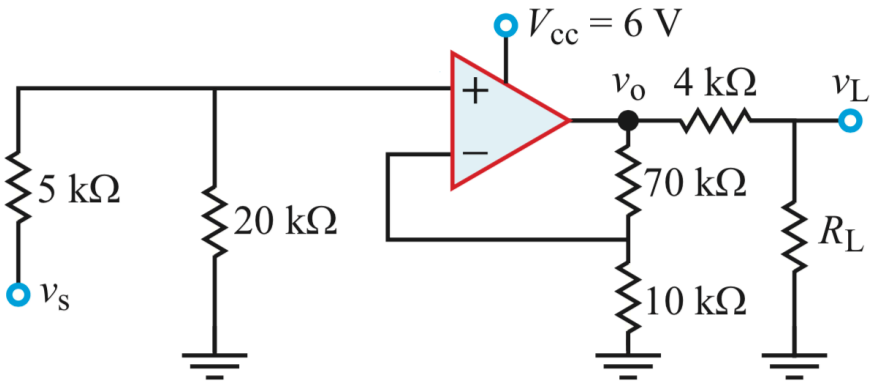


5. Refer to the op amp circuit in Fig below. Calculate i_x and the power absorbed by the 3-kΩ resistor.

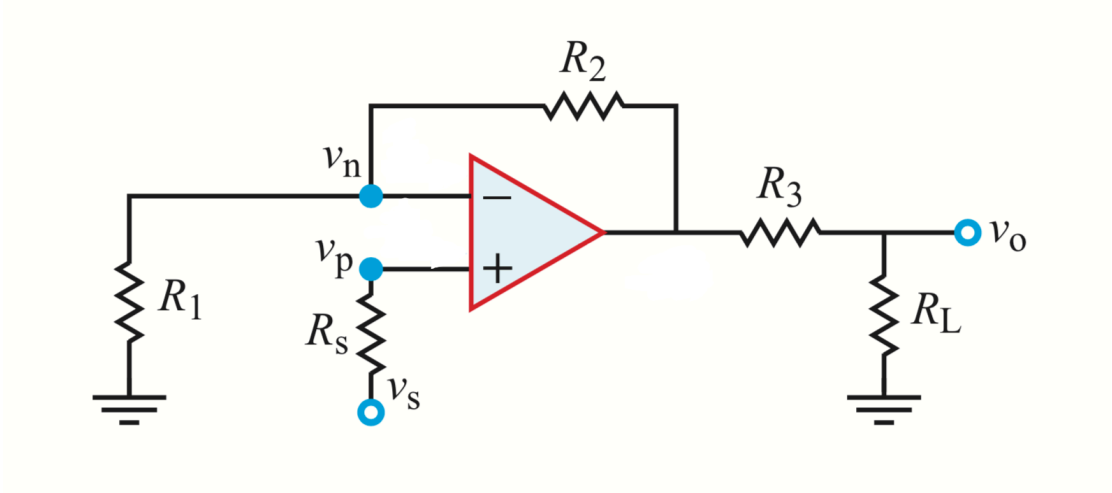


6. For the circuit of the Fig below, what should the resistance of R_L be so as to have the maximum transfer of power into it?

   We can assume that the operational amplifier operates in its linear region.



7. Obtain an expression for the voltage gain $G=v_0/v_s$ foe the circuit in Fig below.



8. In the circuit of Fig below, a bridge circuit is connected at the input side of an inverting op-amp circuit.

(a) Obtain the Thevenin equivalent at terminals (a , b) for the bridge circuit.

(b) Use the result in (a) to obtain an expression for $G = \upsilon_o/\upsilon_s$.

(c) Evaluate G for $R_1 = R_4 = 100\Omega$, $R_2 = R_3 = 101\Omega$, and $R_f = 100k\Omega$.