CG1108 Extra Practice questions

1. An incandescent light bulb rated at 60W will dissipate 60W as heat and light when connected across a 100V ideal voltage source. Similarly a 100W light bulb will dissipate 100W when connected to the same source. If the bulbs are connected in series, determine the power that each one of the bulbs will dissipate.

   [23.44W, 14.06W]

2. With no load attached, the voltage at the terminals of a particular power supply is 50.8V. When a load is connected, the voltage across the load is 49V and the power dissipated by the load is 10W.

   a) Determine the V_s and R_s for this non-ideal source. [50.8V, 8.82 Ω]

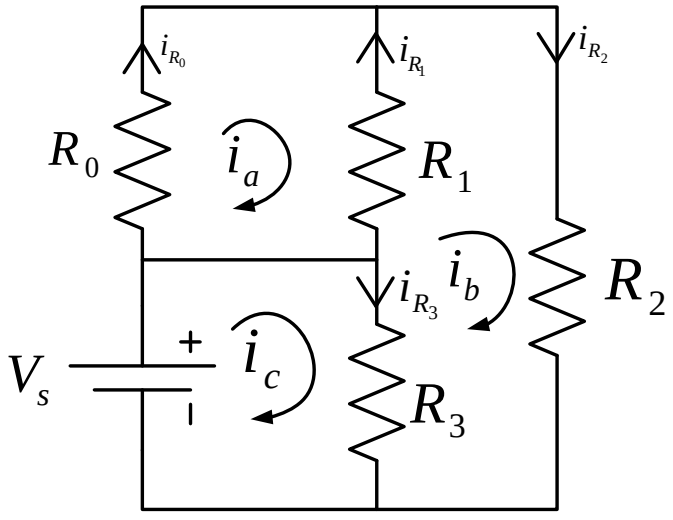
   b) What voltage would be measured at the terminals in the presence of a 15Ω resistor? [32.99V]

   c) How much current could be drawn from this power supply under short-circuit condition? [5.76A]

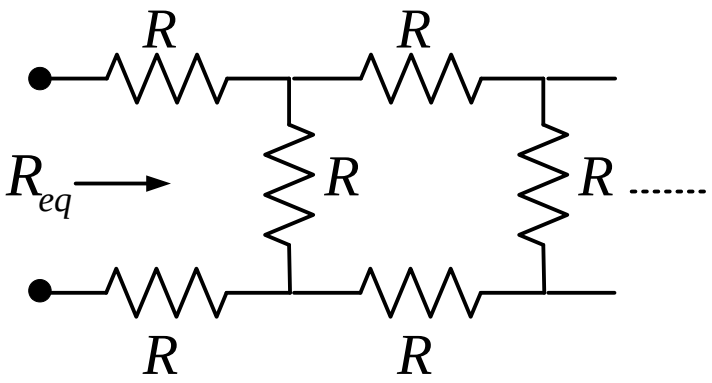
3. Assume $R_0 = 2\Omega, R_1 = 1\Omega, R_2 = 4/3\Omega, R_3 = 6\Omega.$, and $V_s = 12V$ in the circuit.

   a) Find i_a, i_b, i_c. $[2A, 6A, 8A]$

   b) The current through each resistance. $[i_{R_0} = 2A, i_{R_1} = 4A, i_{R_2} = 6A, i_{R_3} = -2A]$

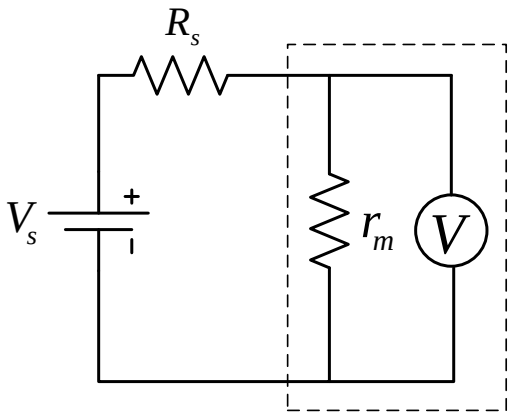


4. Determine the equivalent resistance of the infinite network of resistors in the circuit.



[2.73R]

5. A practical volt meter has an internal resistance r_m. What is the value of r_m if the meter reads 11.81V when connected as shown in the circuit.

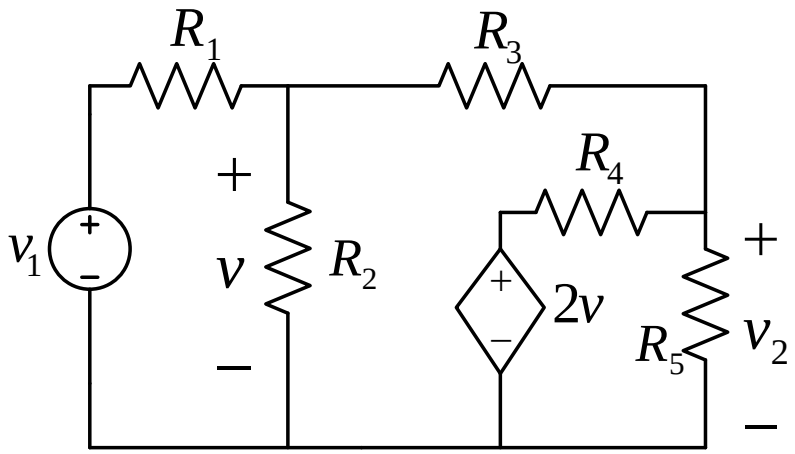


$$V_s = 12V \quad R_s = 25k\Omega$$

[1554kΩ]

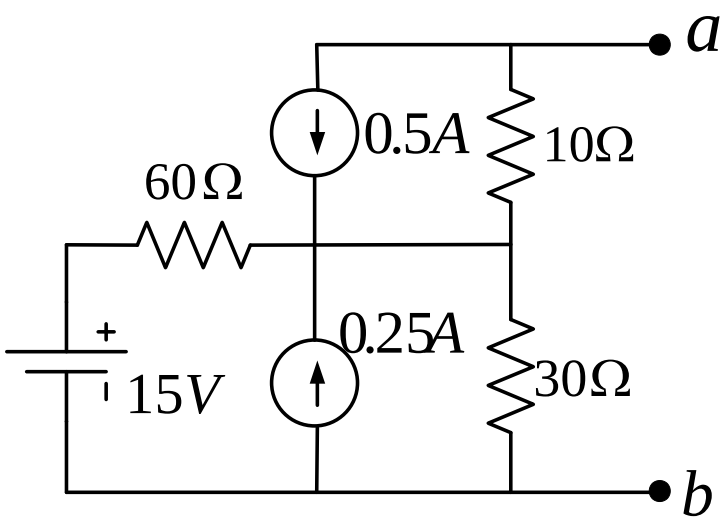
6. Determine the voltge "gain" $A_v = v_2/v_1$ in the amplifier circuit.

$$R_1 = 1\Omega, R_2 = 0.5\Omega, R_3 = 0.25\Omega, R_r = 0.25\Omega, R_5 = 0.25\Omega$$



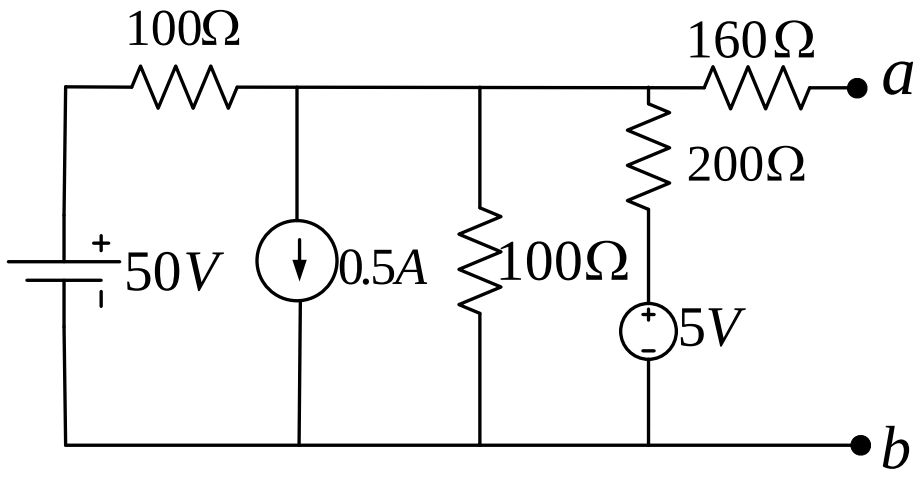
[0.33]

7. Find the Thevenin equivalent circuit for the circuit between nodes a and b.



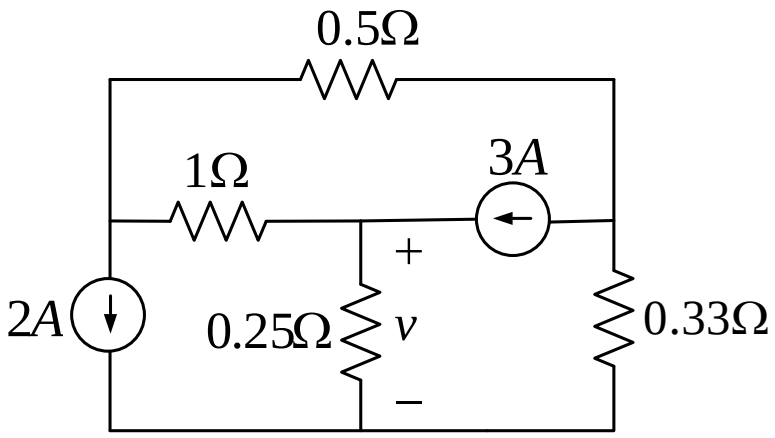
[5V, 30Ω]

8. Compute the Norton's equivalent of the circuit between nodes a and b.



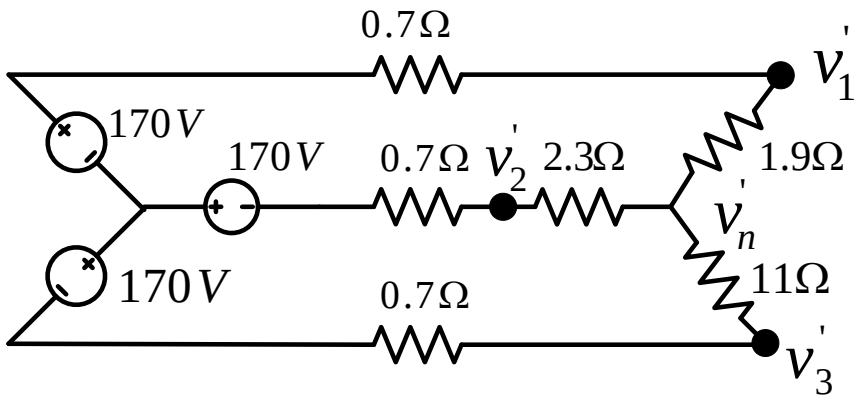
[0.005A, 200Ω]

9. Find the voltage v across the 0.25Ω resistance.



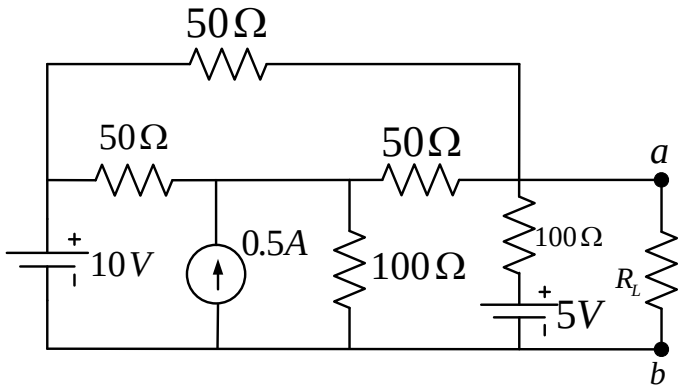
[0.34V]

10. Determine the node voltages v_1', v_2' and v_3' with respect to v_n'.



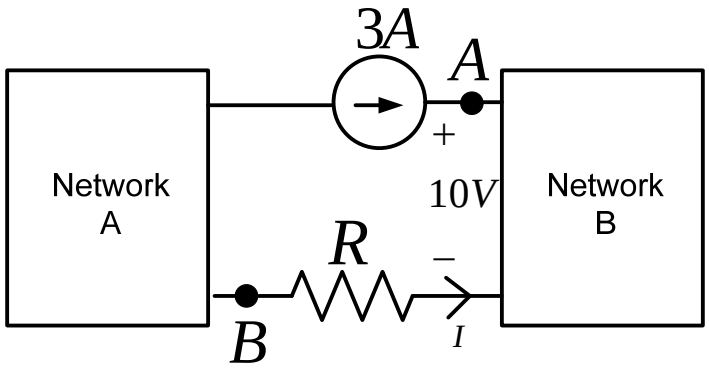
[23.54V, -111.14V, -136.29V]

11. Find the Thevenin equivalent resistance seen by the load resistor R_L in the circuit.



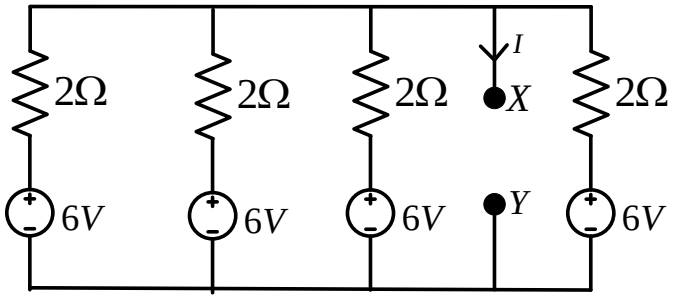
[23.81Ω]

12. In the circuit determine the current I and the voltage V_{AB} for each of the cases $R = 2, 0, 6\,\Omega$.



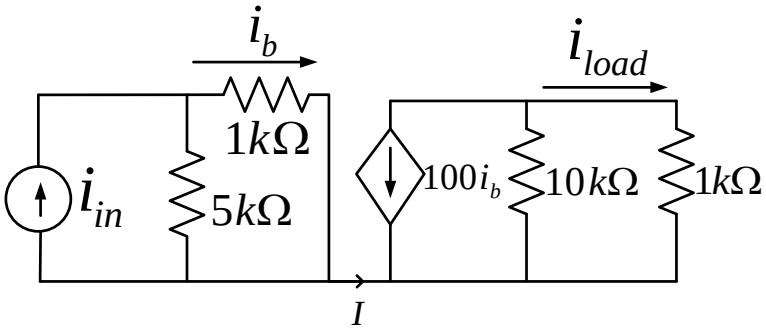
[16V, 10V, 28V]

13. In the circuit determine the voltage across the terminals X and Y when (a) they are on open-circuit, (b) they are short-circuited and (c) a resistor of 1Ω is connected across them. Determine also the current I for all three cases.



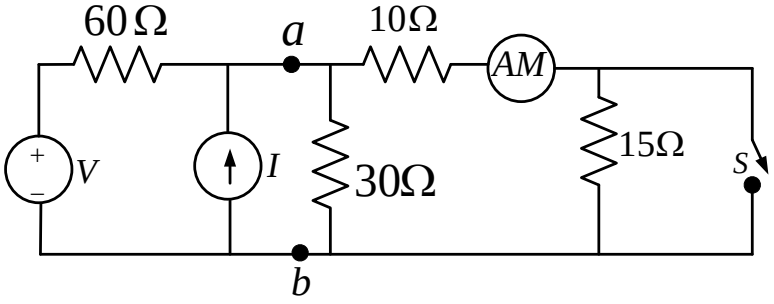
[(a) 6V, 0A; (b)12A, 0V; (c) 4V, 4A]

14. Determine the current gain $A_i = \frac{i_{load}}{i_{in}}$.



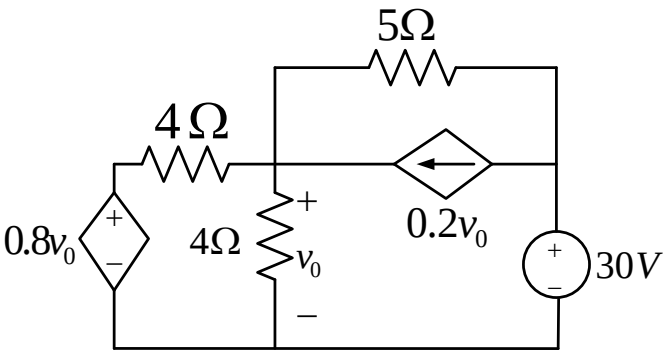
[-75.76]

15. In the circuit when the switch is closed, the ammeter AM reads 3A. Predict ammeter reading with the switch S open. Use Norton's theorem.



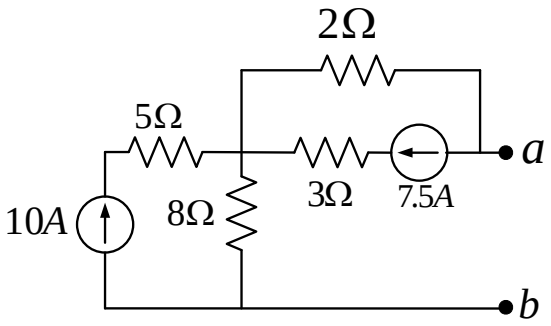
[2A]

16. Determine the voltage v_o in the circuit.



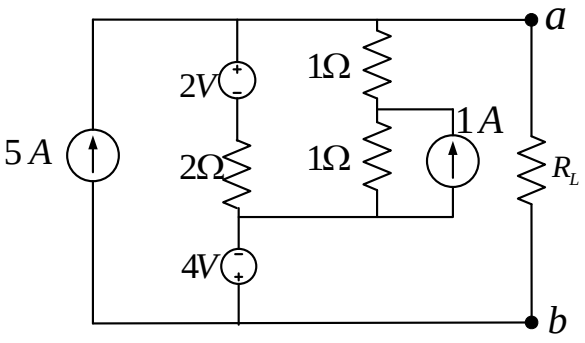
[20V]

17. Determine the Thevenin and Norton equivalent circuits between *a* and *b*.



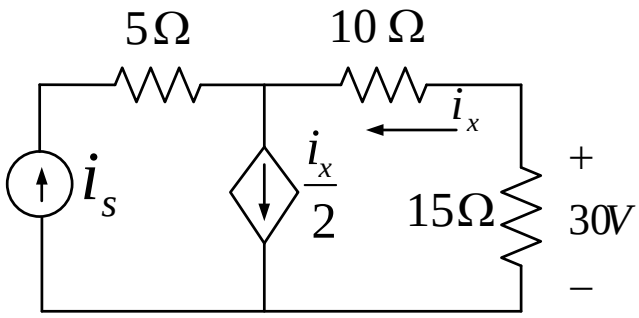
[65V, 10Ω; 6.5A, 10Ω]

18. Determine the maximum power delivered to the load resistor R_L.



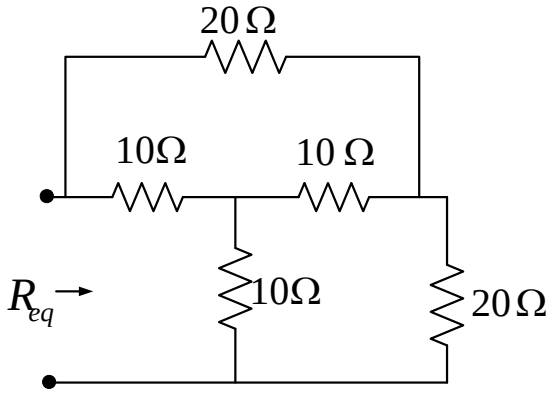
[1.56W]

19. For the circuit, solve for i_s.



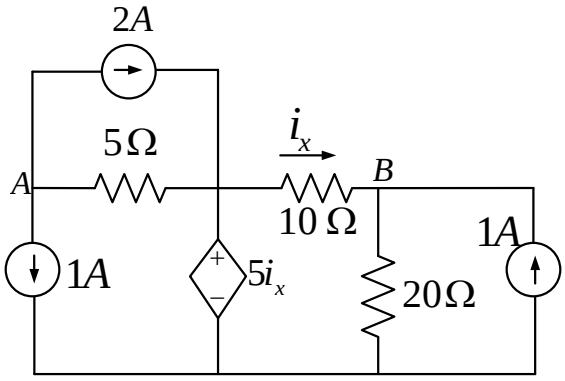
[1A]

20. Find the equivalent resistance of the network.



[13.33Ω]

21. Find the voltage V_{AB} in the circuit.



[-23V]