1. (24 pts) Find the resistor values. Show your work

Note: feel free to show answers & work right on the schematic

a) \( R_4 = ? \)
b) \( R_3 = ? \)
c) \( I_S = ? \)

2. (20 pts) Use the method of superposition to find the voltage across \( R_3 \) (\( V_{R3} \)) and the current through \( R_2 \) (\( I_{R2} \)). Be sure to clearly show and circle your intermediate results.

3. (27 pts) a) Find and draw the Thévenin equivalent of the circuit shown.

The load resistor is \( R_L \).

b) Find and draw the Norton equivalent of the same circuit.

c) Find the power dissipated in the load using your Thévenin equivalent circuit.

\( P_{RL} = ? \)

d) Select a load resistor to maximize the power delivered to the load and find that maximum power.

\( P_{RLmax} = ? \)
4. (18 pts) a) Use nodal analysis to find the voltage across $R_3 (V_{R3})$.

You **MUST** show all the steps of nodal analysis work to get credit, including drawing appropriate symbols and labels on the circuit shown.

b) Find the current through $R_2 (I_{R2})$.

$I_{R2} =$ ?

5. (11 pts) 

a) Find $C_{eq}$ between terminals a and b.

b) Find $C_{eq}$ between terminals c and d.

Answers

1. a) 2-kΩ  b) 850-Ω  c) 29-mA

2. 4-mA - 5-mA = -1-mA  4.8-V + 3-V = 7.8-V

3. a) 250-Ω  b) 28.8-mA  c) 28.8-mW  d) 51.84-mW

4. a) 6-V  
b) 10-mA

5. a) 4-µF  b) 20-µF