1. (26 pts) Find the values below. Show your work, which may appear right on the schematic.

a) \( R_1 = ? \)

b) \( R_3 = ? \)

c) \( P_S = ? \)

Ideal voltmeter reads 3 V.

Ideal ammeter reads 40 mA.

\( V_S := 14 \text{ V} \)

\( I_S := 7 \text{ mA} \)

2. (24 pts) Use the method of superposition to find the readings of the two ideal meters. Be sure to redraw the circuit as needed and to clearly show and circle your intermediate results.
3. (26 pts) a) Find and draw the Thévenin equivalent of the circuit shown. The load resistor is $R_L$.

$$I_S := 70\text{ mA}$$

$$R_1 := 350\Omega$$

$$R_L := 2\text{ k}\Omega$$

$$R_2 := 1.4\text{ k}\Omega$$

$$R_3 := 525\Omega$$

$$R_4 := 175\Omega$$

b) Find the load current using your Thévenin equivalent circuit.

c) Choose a different value of $R_L$ so as to maximize the power dissipated in $R_L$. Find that maximum power $P_{RL\text{max}}$.

4. (24 pts) Use nodal analysis to find the voltage $V_{R3}$ and the current $I_{R2}$.

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

Answers

1. a) 350\Omega  
   b) 250\Omega  
   c) 0.7\text{ W}  
   2. 0.5\text{ mA}  
   12.8\text{ V}  
2.  
3. a)  
   b) 7.7\text{ mA}  
   c) 500\text{ \Omega}  
   4. a) 4.8\text{ V}  
   b) 220\text{ mA}  

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