Circuits Lab

Vincent Edwards

Mt. San Antonio College, Physics 4B, CRN 42240
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$R_2 = 40\ \Omega$

1. Purpose

The goal of the exercise was to use Kirchhoff's rules to analyze 7 different circuits and calculate current, voltage, and power for each circuit element. For the first 4 circuits, the voltage and current calculations were compared to results obtained using an online circuit simulator.

2. Results

The following tables contain the theoretical voltage, current, and power for each circuit element for each of the 7 circuits. In addition, there is an annotated circuit diagram for each circuit.

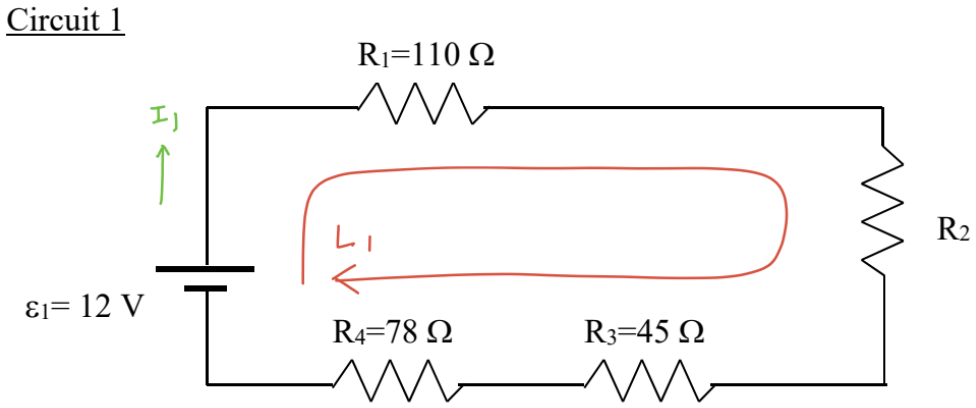

Figure 1. Circuit 1

Table 1. Circuit 1 V, I, and P

	V (V)	I (A)	P (W)
$\mathcal{E}_1$	12.0	0.0440	0.527
R_1	4.84	0.0440	0.213
R_2	1.76	0.0440	0.0773
R_3	1.98	0.0440	0.0869
R_4	3.43	0.0440	0.151

3. Calculations

4. Conclusion

5. Citations

[1] Karen Schnurbusch, *Physics 4B Lab Book*, Mt. San Antonio College, 2023, pp. 71-74.
[2] Karen Schnurbusch, *Physics 4B Equations*, Mt. San Antonio College, 2023, pp. 4, 5.

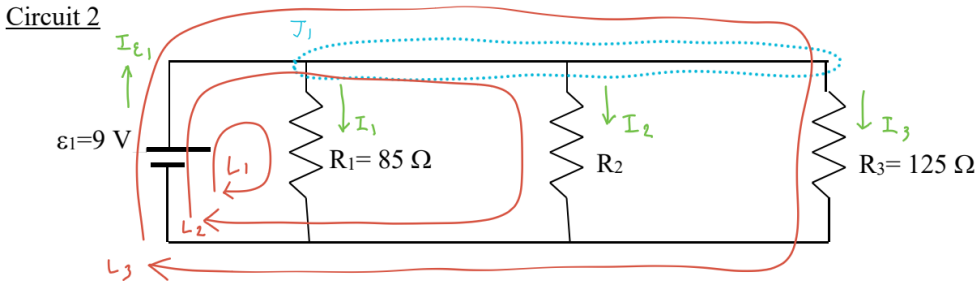

Figure 2. Circuit 2

Table 2. Circuit 2 V, I, and P

	V (V)	I (A)	P (W)
$\mathcal{E}_1$	9.00	0.403	3.63
R_1	9.00	0.106	0.953
R_2	9.00	0.225	2.02
R_3	9.00	0.0720	0.648

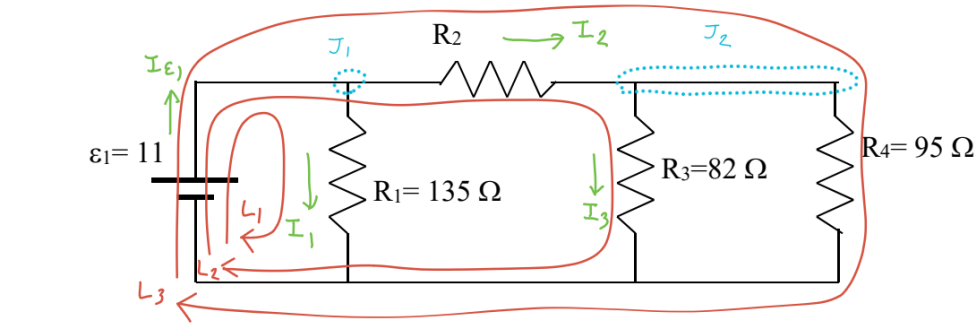

Figure 3. Circuit 3

Table 3. Circuit 3 V, I, and P

	V (V)	I (A)	P (W)
$\mathcal{E}_1$	11.0	0.212	2.34
R_1	11.0	0.0815	0.896
R_2	5.24	0.131	0.686
R_3	5.76	0.0703	0.405
R_4	5.76	0.0607	0.350

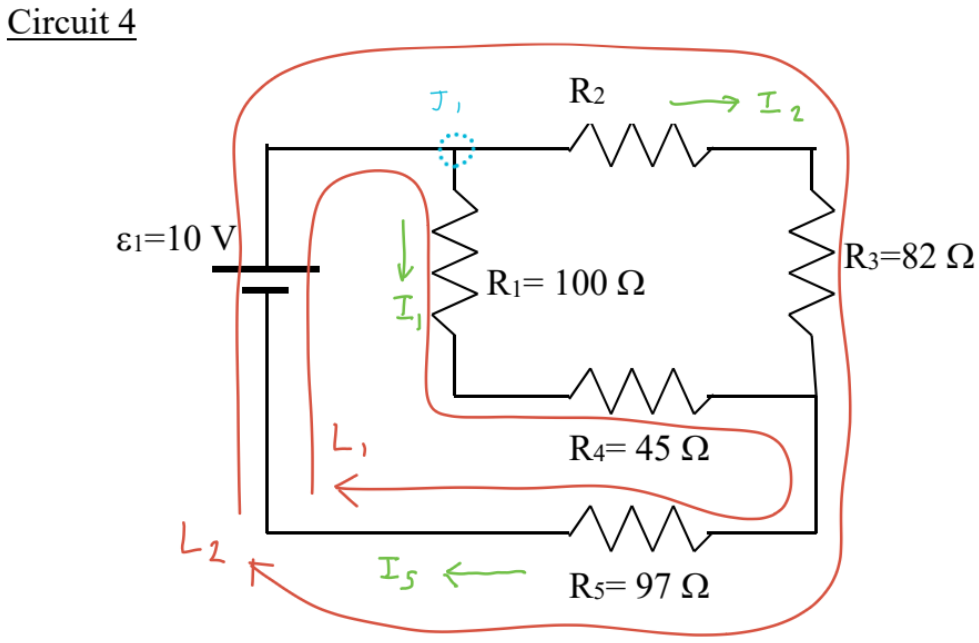

Figure 4. Circuit 4

Table 4. Circuit 4 V, I, and P

	V (V)	I (A)	P (W)
$\mathcal{E}_1$	10.0	0.0613	0.613
R_1	2.80	0.0280	0.0783
R_2	1.33	0.0333	0.0443
R_3	2.73	0.0333	0.0907
R_4	1.26	0.0280	0.0353
R_5	5.94	0.0613	0.364

Table 5. Circuit 5 V, I, and P

	V (V)	I (A)	P (W)
$\mathcal{E}_1$	14.0	0.0750	1.05
$\mathcal{E}_2$	5.00	0.0750	0.375
R_1	2.62	0.0750	0.197
R_2	3.00	0.0750	0.225
R_3	3.38	0.0750	0.253

Circuit 5

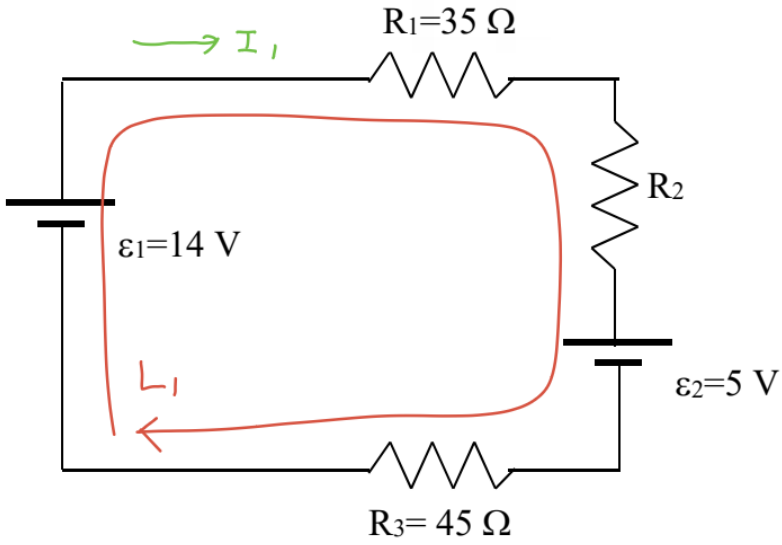

Figure 5. Circuit 5

Circuit 6

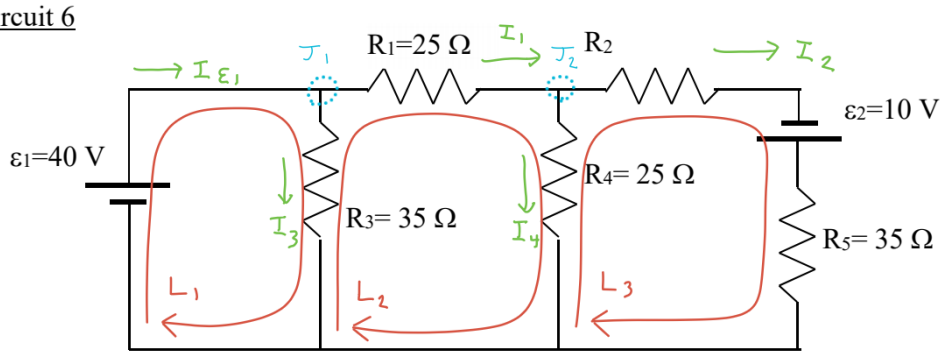

Figure 6. Circuit 6

Table 6. Circuit 6 V, I, and P

	V (V)	I (A)	P (W)
$\mathcal{E}_1$	40.0	2.11	84.6
$\mathcal{E}_2$	10.0	0.343	3.43
R_1	24.3	0.971	23.6
R_2	13.7	0.343	4.70
R_3	40.0	1.14	45.7
R_4	15.7	0.629	9.88
R_5	12.0	0.343	4.11

Circuit 7 (It is recommended to solve this circuit using a matrix.)

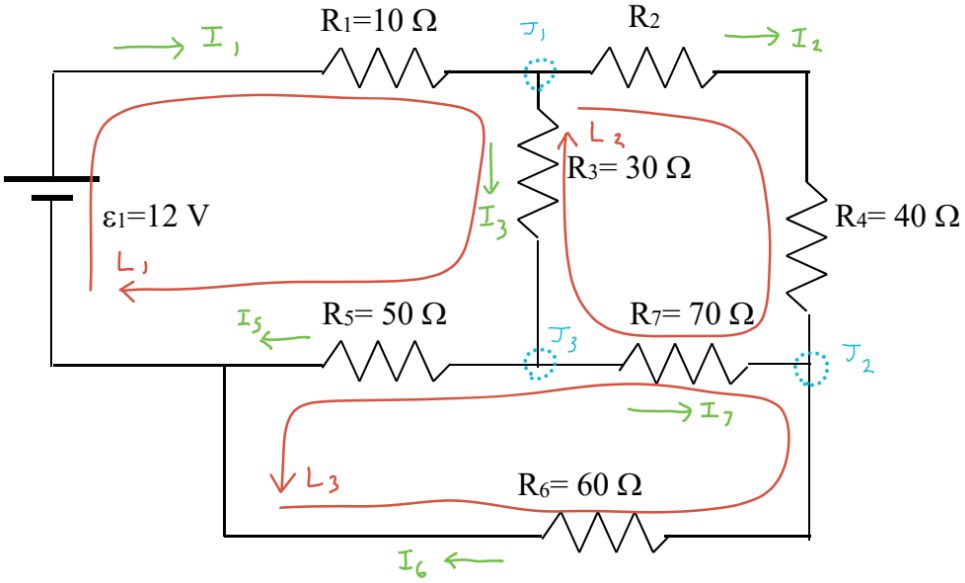

Figure 7. Circuit 7

Table 7. Circuit 7 V, I, and P

	V (V)	I (A)	P (W)
$\mathcal{E}_1$	12.0	0.200	2.40
R_1	2.00	0.200	0.399
R_2	2.58	0.0646	0.167
R_3	4.05	0.135	0.547
R_4	2.58	0.0646	0.167
R_5	5.95	0.119	0.709
R_6	4.83	0.0806	0.390
R_7	1.12	0.0160	0.0179