Electronics Lab 1

Andrew Rippy*
Department of Physics, Wabash College, Crawfordsville, IN 47933
(Dated: February 2nd, 2021)

The purpose of this lab was to create simple circuits, and see the voltage vs. current over 4 components; an LED, Germanium Diode, Lamp, and a resistor.

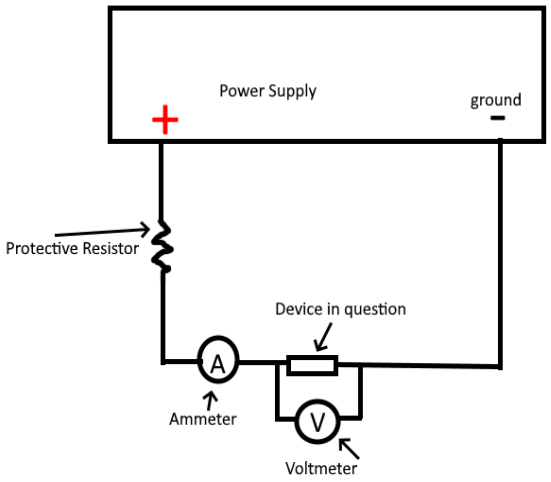


FIG. 1. The general circuit

I. INTRODUCTION

Using an ammeter and voltmeter, we measured the voltage and amps of the circuit component in question.

II. THEORETICAL MODEL

If the component is ohmic, it should follow Ohm's law,

$$V = IR \tag{1}$$

Thus, if the curve of the voltage vs. current is linear, it is ohmic, otherwise, it is not.

III. EXPERIMENT

A. Procedure

For the experiment we set up various simple circuits with a resistor in series with the component in question. The circuit was powered by a variable power supply, and the general form of the circuit is shown in Fig. 1.

B. Data

For each component, we ran current both forward and backward through the device. Units are in volts and mAmps, unless otherwise specified. See attached data.

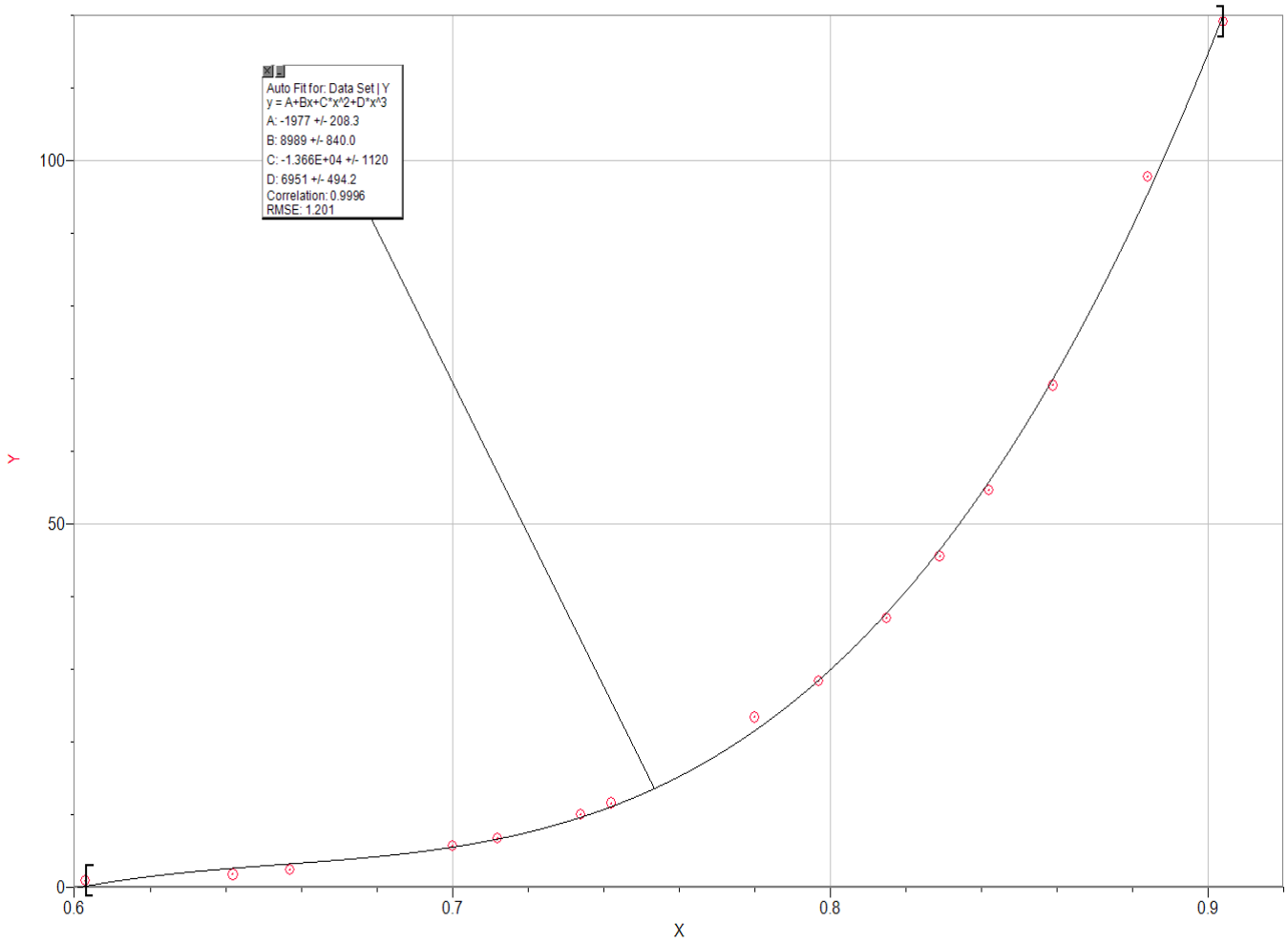
IV. CONCLUSION

In conclusion: Resistors were found to be ohmic, LED's were found to not be ohmic, Diodes were found to not be ohmic, and Lamps were found to not be ohmic.

ACKNOWLEDGEMENTS

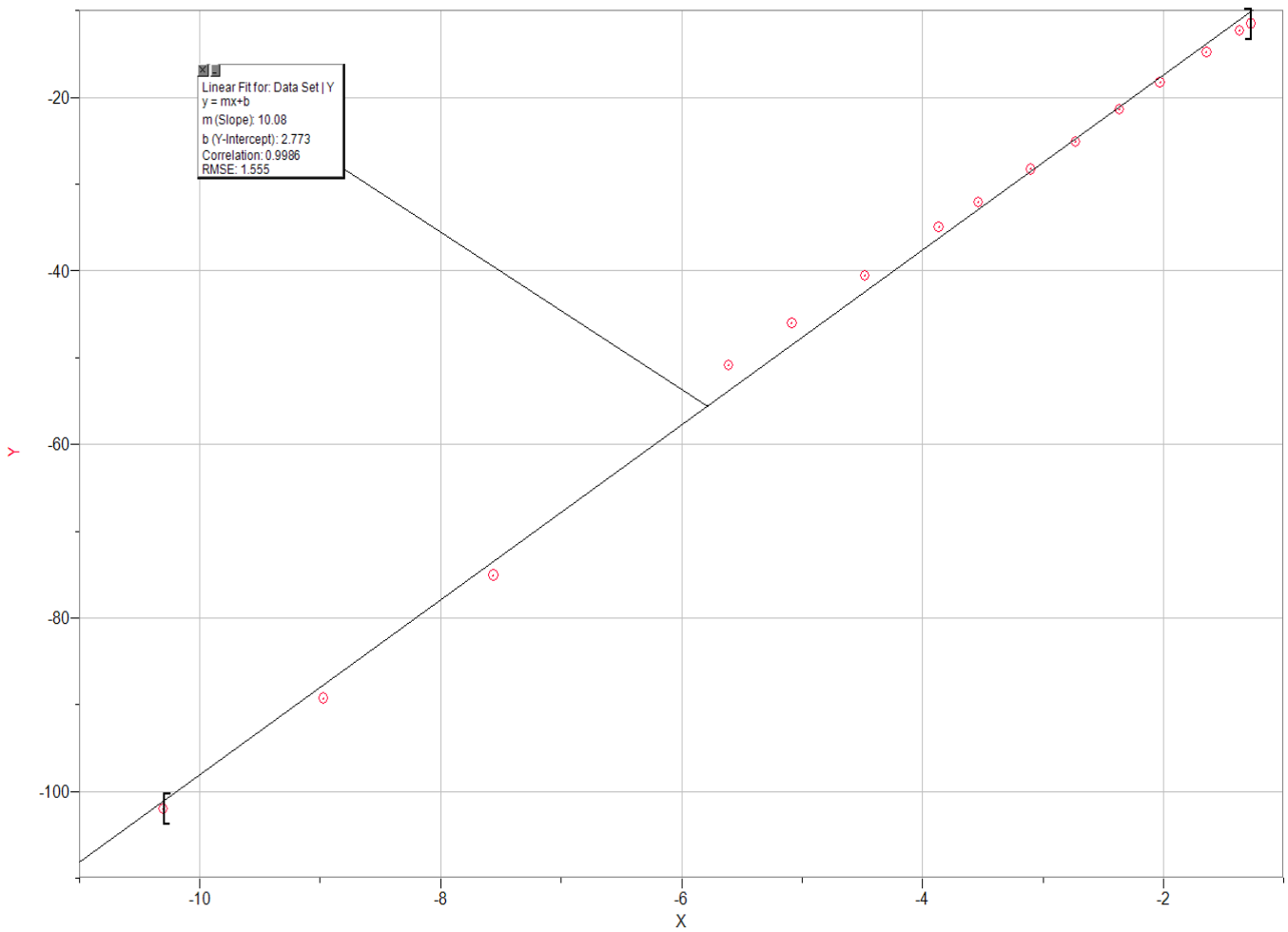
I acknowledge the support of the Wabash College Physics Department and Professor Brown's benevolence in these crazy times.

* anrippy22@wabash.edu



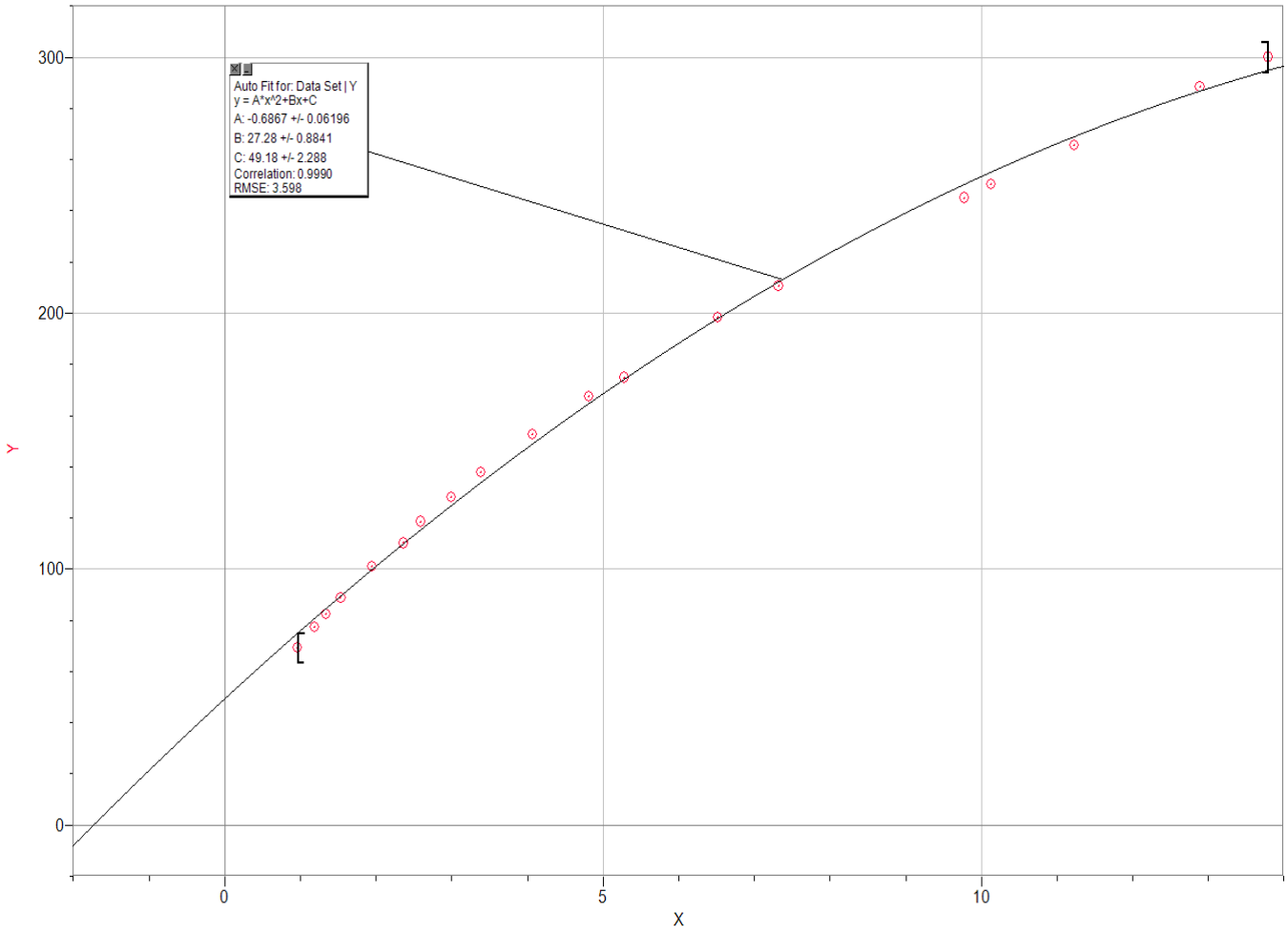
	Data Set	
	X	Y
1	0.7	5.64
2	0.712	6.66
3	0.734	9.995
4	0.742	11.55
5	0.78	23.38
6	0.797	28.33
7	0.815	37.06
8	0.829	45.5
9	0.842	54.7
10	0.859	69.07
11	0.884	97.82
12	0.904	119.19
13	0.603	0.91
14	0.642	1.72
15	0.657	2.36

FIG. 2. Diode Forward



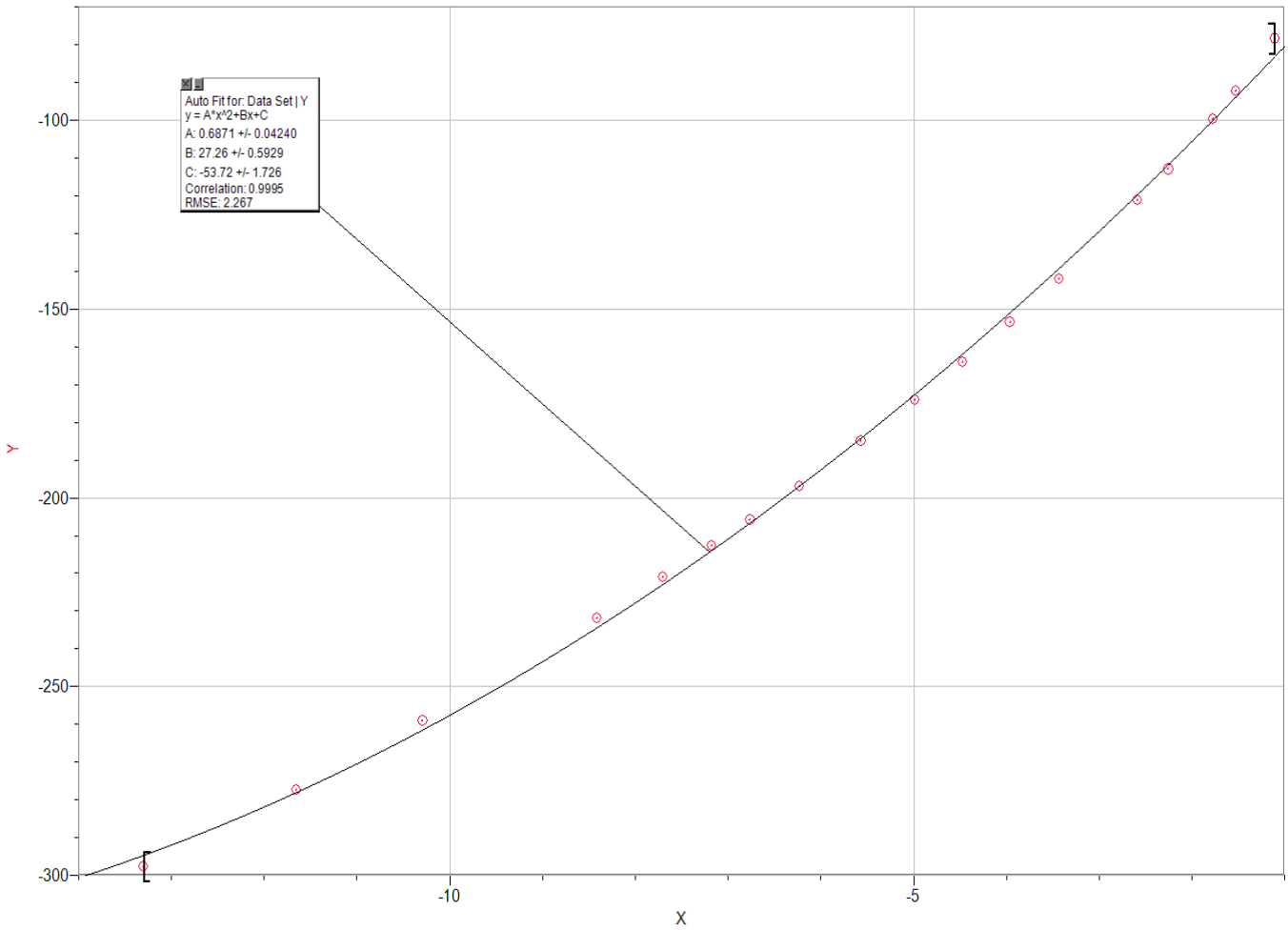
	Data Set	
	X	Y
1	-1.27	-11.5
2	-1.365	-12.3
3	-1.64	-14.8
4	-2.027	-18.3
5	-2.365	-21.4
6	-2.73	-25.1
7	-3.101	-28.3
8	-3.532	-32.1
9	-3.863	-35
10	-4.478	-40.6
11	-5.083	-46
12	-5.61	-50.9
13	-7.56	-75.1
14	-8.97	-89.3
15	-10.3	-102

FIG. 3. Diode Backward



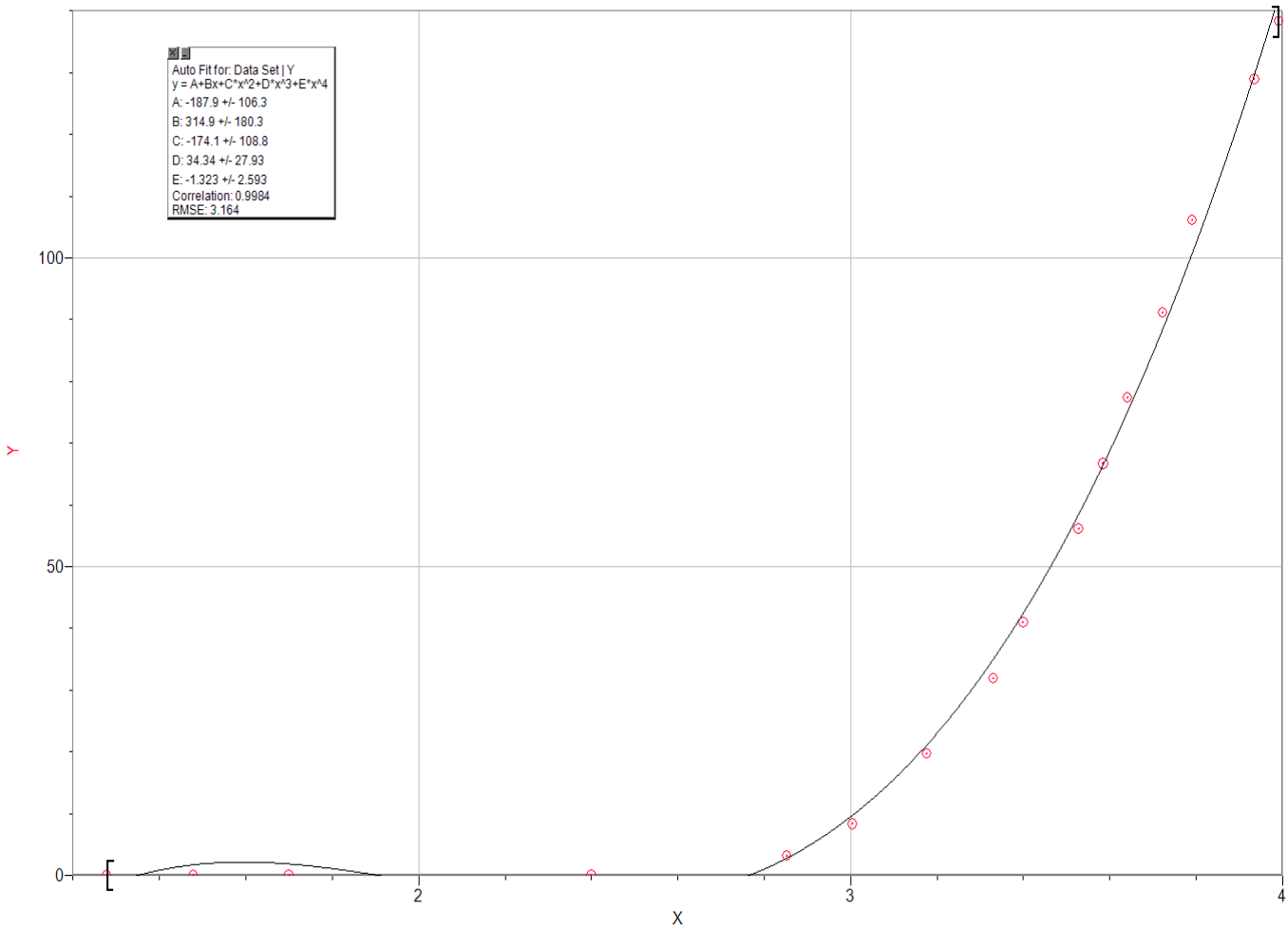
	Data Set	
	X	Y
1	0.963	69.225
2	1.185	77.147
3	1.341	82.451
4	1.536	88.678
5	1.945	101.1
6	2.367	110.1
7	2.588	118.52
8	2.992	128.159
9	3.39	137.7
10	4.065	152.478
11	4.815	167.567
12	5.285	174.772
13	6.515	198.181
14	7.32	210.625
15	9.78	245.03
16	10.13	250.3
17	11.23	265.45
18	12.89	288.5
19	13.79	300.01

FIG. 4. Lamp Forward



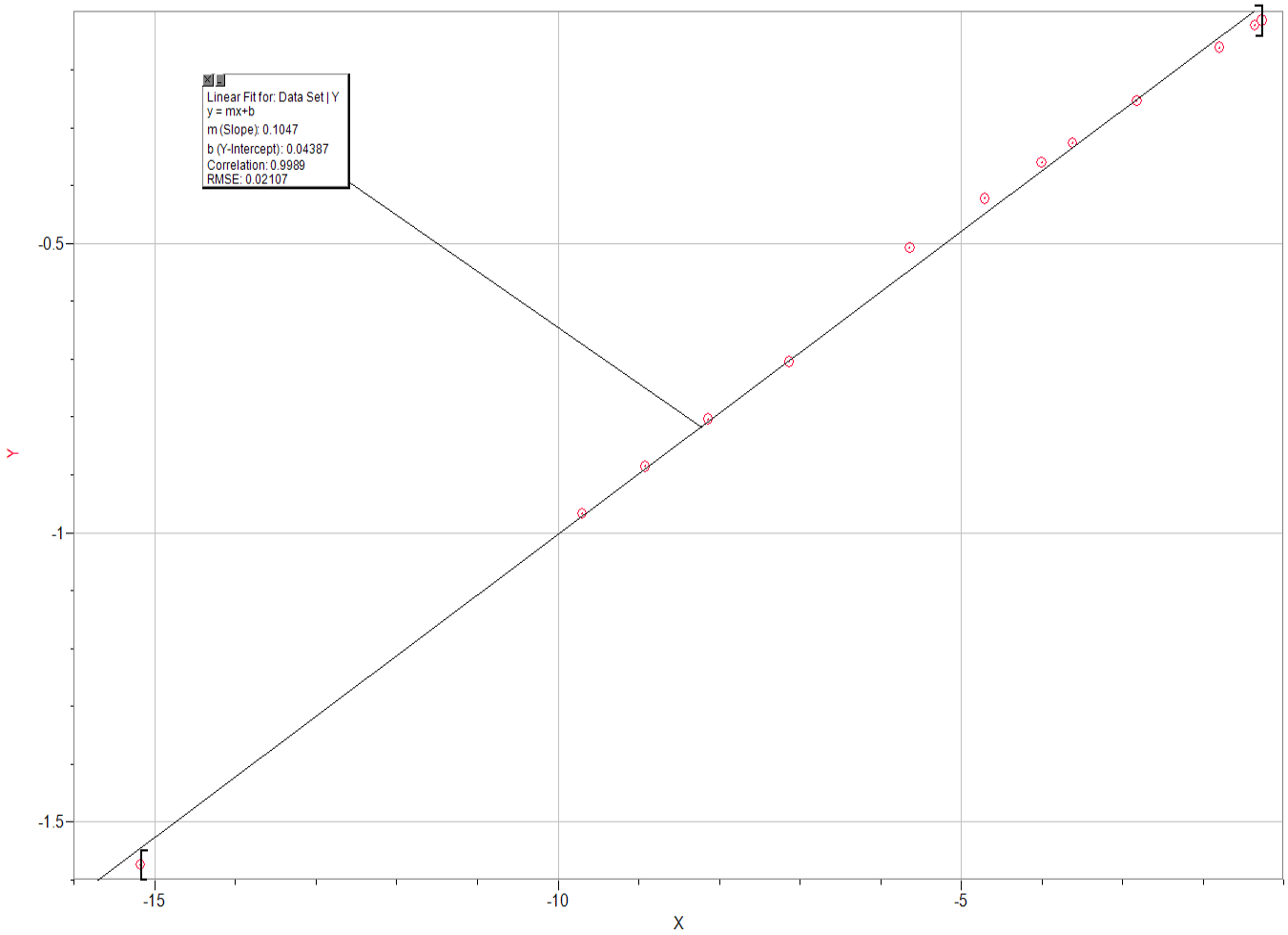
	Data Set	
	X	Y
1	-1.103	-78.32
2	-1.524	-92.13
3	-1.772	-99.57
4	-2.253	-112.94
5	-2.588	-121.21
6	-3.429	-141.96
7	-3.96	-153.4
8	-4.47	-163.96
9	-4.985	-174.16
10	-5.567	-185.03
11	-6.23	-196.87
12	-6.76	-205.93
13	-7.18	-212.74
14	-7.7	-221.03
15	-8.41	-231.83
16	-10.29	-259.09
17	-11.65	-277.5
18	-13.3	-297.72

FIG. 5. Lamp Backward



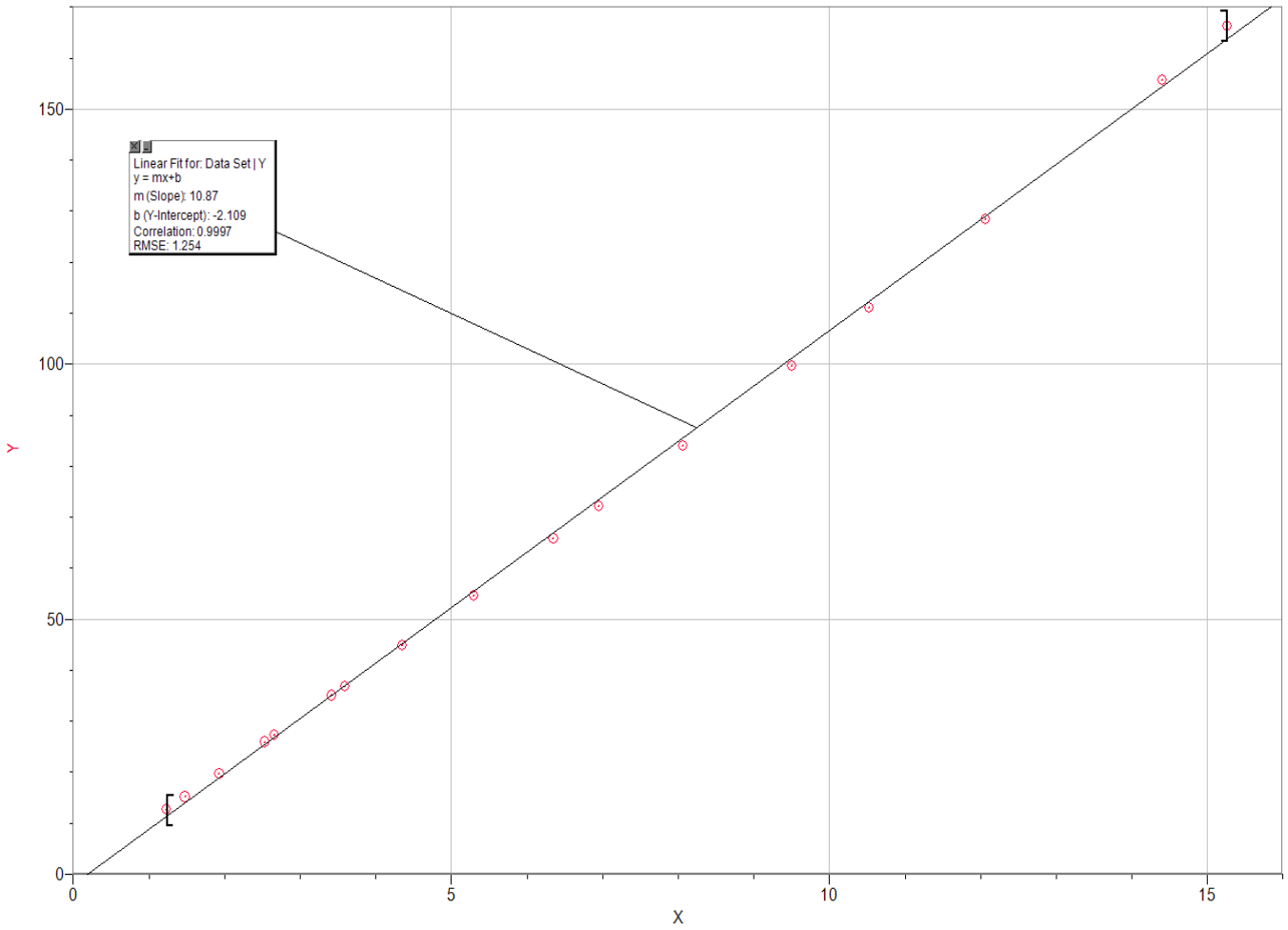
	Data Set	
	X	Y
1	1.278	0
2	1.478	0
3	1.7	0
4	2.4	0.02
5	2.853	3.148
6	3.004	8.276
7	3.177	19.63
8	3.33	31.832
9	3.4	40.937
10	3.528	56.115
11	3.585	66.652
12	3.642	77.286
13	3.722	91.1
14	3.791	106.12
15	3.935	128.95
16	3.992	138.3

FIG. 6. LED Forward



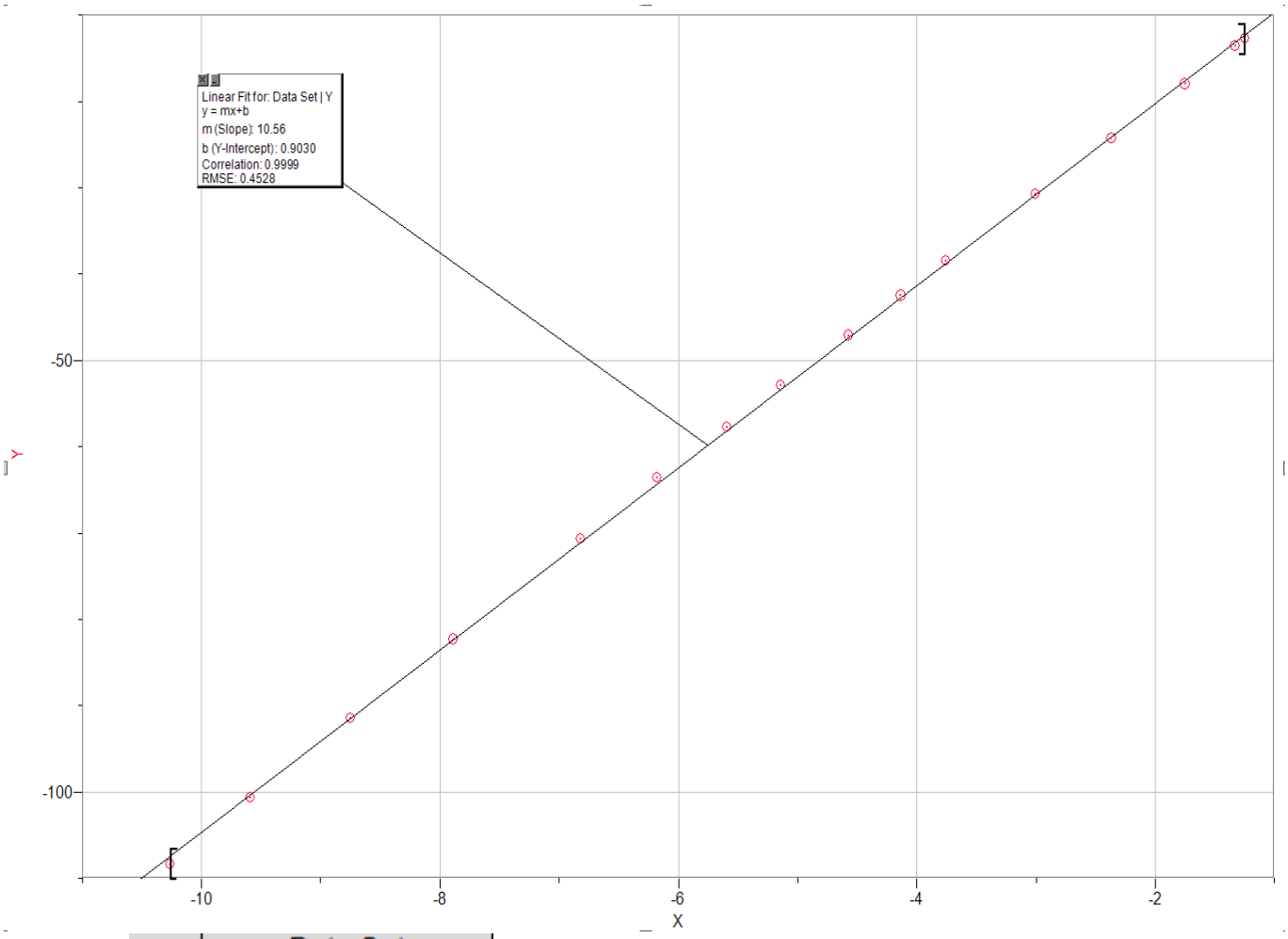
	Data Set	
	X	Y
1	-1.269	-0.115
2	-1.362	-0.123
3	-1.795	-0.162
4	-2.82	-0.254
5	-3.62	-0.327
6	-4.002	-0.36
7	-4.704	-0.423
8	-5.636	-0.508
9	-7.13	-0.705
10	-8.14	-0.804
11	-8.92	-0.886
12	-9.7	-0.967
13	-15.18	-1.574

FIG. 7. LED Backward (micro amps)



	Data Set	
	X	Y
1	-1.245	-12.71
2	-1.33	-13.6
3	-1.75	-17.97
4	-2.368	-24.27
5	-3.004	-30.78
6	-3.755	-38.47
7	-4.133	-42.48
8	-4.569	-47.1
9	-5.14	-52.9
10	-5.59	-57.75
11	-6.177	-63.62
12	-6.82	-70.66
13	-7.89	-82.32
14	-8.75	-91.44
15	-9.59	-100.7
16	-10.26	-108.37

FIG. 8. Resistor Forward



	Data Set	
	X	Y
1	1.23	12.62
2	1.478	15.13
3	1.931	19.72
4	2.536	25.9
5	2.655	27.25
6	3.413	35.02
7	3.59	36.86
8	4.351	44.79
9	5.294	54.63
10	6.352	65.72
11	6.95	72.07
12	8.06	84.01
13	9.5	99.65
14	10.53	111.07
15	12.07	128.44
16	14.4	155.77
17	15.26	166.35

FIG. 9. Resistor Backward