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**Linear vs Non-Linear Circuits; Magnetic Field Measurements Lab Report**

**Your Name: ? Partner’s Name: ?**

**Section: ? Date: ?**

1. Report your least-squares-fit values for both the equivalent circuit resistance and R68 in industry-standard form (uncertainty rounded to one digit, unless that digit is one, in which case round the uncertainty to two digits; the main value then rounded to the same place value as the uncertainty).
2. For the linear circuit, fill in the V, I, and R = V/I values for each of the three resistors in Sketch #1 where indicated. With the original two pairs of I,V values, you will be able to fill in the I,V values for each of the three resistors. Then you will be able to calculate the resistance of each of the three resistors used in the circuit from the corresponding I,V data using Ohm’s law. (Some of these I,V values you have measured directly. The values not measured you can deduce from the set of measured values. For example, the voltage across the 51 Ω resistor is your measured V2 value, and the current through the 68 Ω resistor is your measured A2 value. And please be aware that the voltage across the 10 Ω resistor is NOT equal to the voltage across the entire circuit! Rather, it is the difference V1 – V2.)

Sketch #1

10 Ω

51 Ω

68 Ω

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1. For the nonlinear circuit, fill in the V, I, and R = V/I values for each of the three resistive elements in Sketch #2 for the maximum-V point, and in Sketch #3 for the minimum-nonzero-V point. Just as above in Problem 2, place the actually-measured values where appropriate, and then figure out the remaining I and V values using standard circuit analysis techniques. Determine the R values from the corresponding ratios V/I (recognizing that Ohm’s law does not work properly for nonlinear elements – the slope of the tangent line would be better – but comparisons of the V/I ratios at the two voltage extremes will demonstrate the nonlinear behavior well enough).

Sketch #2

10 Ω

51 Ω

#50

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Sketch #3

10 Ω

51 Ω

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