MAE221 Thermodynamics Lab – Lab 1.1 ***(20 Marks)***

Name:

Lab Day:

If you are working with a group because you have not received kit 1, please note the names of people you are working with:

***Instructions:*** Complete this worksheet as you work through the labs. Once completed, submit it through Canvas before the start of your next lab. Each person should submit a worksheet.

***Exercise 1***

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| Figure 1: Circuit diagram for setup 1 | ***From Ohm’s Law what is expected current passing through the circuit? (2 Marks)***  ***Using a multimeter, measure the resistance of the resistor? What is the tolerance of the resistor? Is this resistor within tolerance?***  ***(1 Marks)*** |

***Exercise 2***

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Figure 2: Circuit diagram for setup 2. | **Measure the voltage drop across each resistor and then calculate the current passing through each resistor using Ohm’s Law (4 Marks). The resistance R1+R2 should be as close to 1000** **as you can make with the given resistors.**   |  |  |  | | --- | --- | --- | | Measured  Resistor |  |  | | Measured |  |  | | Calculated |  |  |   ***What does this say about the current in a series circuit? (1 Mark)*** |

***Exercise 3***

***Jasper is soldering together 1000 fairy lights (LEDs). Each LED has a resistance R. Should he solder them in series or parallel? Draw a circuit diagram of a subsection of this light arrangement using (3 LEDS) and justify your circuit selection.***

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| --- | --- |
| Circuit Diagram ***(2 marks)*** | Explanation ***(2 Marks)*** |

***Exercise 4***

***Produce a graph of the current at the LED versus the output voltage for the 470 and 1000 resistors as well as the Voltage in vs Voltage at LED. These plots will be directly output from the “***[***Voltage\_vs\_Current\_Curve.m***](https://github.com/MAE221/Thermodynamics-Lab/wiki/LED_Voltage_vs_Current_Curve.m)***” program.***

|  |  |
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| ***(2 Marks)*** | ***(2 Marks)*** |

Answer the following questions on the above plots:

***Can the slope of the Current/Voltage curve be explained with resistor value? (2 Marks)***

***A diode is a non-linear device. Explain why we observe a linear relationship between current and voltage. (2 Marks)***