

Statistics Exercise 12.1.3

Ohms Law

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Problem

According to Ohm's law, the voltage V in volts measured across a resistance of $r = 4$ ohms when a current of J amps is passed through is given by the formula $V = rI$.

- How would you set up an experiment to test Ohm's law using a scatter plot? What sort of trend line or curve should fit the plot? What point should the trend pass through?
- Suppose that the resistance r is unknown. Assuming Ohm's law to be true, how could you use your trend to estimate r ?

Question 2

- People fit theoretical models to data for three main purposes. What are they?

The Experiment

Because r , the resistance, is fixed we can change J , measure V and thus we will have a graph where J (the independent variable) is the x-axis and the voltage (which we measure (the dependent variable)) is the y-axis. Again, because r is fixed we should observe a positive, linear, relationship between the two, save for noise.

Finding R

This means that if r is unknown, it should be the slope of the best-fit line. As we mentioned before, J (current) is x and V (voltage) is y . This means $y = rx$, so once we get a linear representation, the slope will be r .

Models

The reasons I would say are to:

- Estimate the value of new pieces of data, according to the observed trend/pattern.
- Use equation of the best-fit line or trend equation to find the value of certain variables/coefficients.
- To interpret the model as a whole and make meaningful insights, i.e. the type of distribution, confidence intervals, highest value, the spread of the data, the trend of the data, the relationship between variables