Physical Computing Review Quiz 1: Basic Electronics

The following are questions you should be able to answer by the respective weeks in Introduction to Physical Computing. Try to answer all of the questions without resorting to copying external code or diagrams.

If you don't know where to start on a given question, first review the lab and material from the syllabus and then consult with your instructor in office hours.

Since some of the questions below require you to draw the circuit, you'll need to print this out and hand it in to your instructor.

Name and define are the three properties of an electrical circuit that we've described in class so far. How do they relate to each other?

Voltage is a difference in electric potential energy. Current is a flow of electrons through a wire. Resistance is a property of the mediums through which current flows that represents the amount of current that will be generated by a voltage drop across the medium.

Explain how electrical energy flows in a properly working circuit. What are the minimum necessary components? From where does it flow, and to where? What must happen to the energy as it moves through the circuit?

Power flows from high voltage to low voltage. Minimum components are a high voltage source and a low voltage source and a medium to connect them.

What is a short circuit? How does it differ from a properly working circuit?

In a short circuit not all of the power generated by the voltage drop is converted to other energy in the circuit and so returns to the power source.

What are the following components? How are they commonly used in a circuit?

Resistor

Resistors are a bit of metal that "impede" the flow of current by a specified amount.

Potentiometer

A variable resistor - used when a user-controlled resistance is useful.

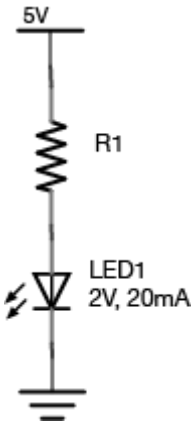
Diode

A diode only allows current to flow in one direction, it's useful when you only want one direction of current to flow through a circuit element.

Transistor

What formula would you use to calculate the value for the resistor in the following circuit? What is the ideal resistance value? What happens if the resistance is too low?

Ohm's law. If resistance is too low the LED could burn out or explode. The ideal resistance is 250Ωs.



If you wanted to decrease the brightness of the LED in the circuit above, what change would you make?

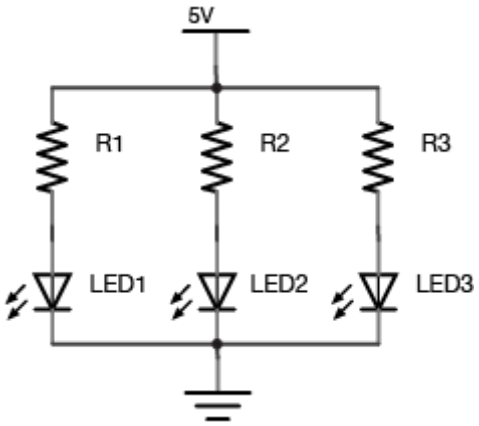
Increase the resistance

What are the first things you should check when troubleshooting any circuit?

Get out your multimeter and check where your voltage changes are occurring.

Identify the components that are in series below, and those that are in parallel:

The resistors are each in series with an LED. The resistor-LED units are each in parallel with each other.



When components are in series, the _____ through them is the same.

Current

When components are in parallel, the _____ across them is the same.

Voltage

When you put batteries in series the _____ adds up.

Voltage

When you put batteries in parallel the _____ adds up.

Current

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