COS 436 / ELE 469
Spring 2013

Assignment 1: Circuits & Electricity (+ a bit more)
Due 2/11/13 at 11:59 PM

The goal of this assignment is to review electricity and electronics basics in preparation for the labs. The format and content of this assignment is **not typical** of other assignments we'll have this semester! (Take a look at the course website for information about the other assignments.)

Instructions:
• Work by yourself.
• Before completing the assignment, install the Arduino[1] and Processing[2] software on your machine.
• Before completing this assignment, read through chapters 1–3 of *Physical Computing*.
• You will hand in this assignment electronically by filling out a Web form
    o   The submission form is available at
        https://docs.google.com/forms/d/1kdpE8sNFSe-Rjs3beQDOg_hxVtLlBJFpRk T48d_kra0/viewform
    o   You will be able to edit your answers after submission, BUT anytime you resubmit your old work will be overwritten with the new timestamp. If you submit late, you will not receive credit.
    o   No need to print anything out, email anything, etc. You might want to record your answers on paper, though, in case the form submission fails in any way.
• Post to Piazza if you have any questions.

Handy resources:
• Your textbook
• Resistor color code information:
  http://en.wikipedia.org/wiki/Electronic_color_code#Resistor_color_coding
• Decoding capacitor codes:
  http://www.muzique.com/schem/caps.htm
• Scott Hudon's electricity slides (posted on Piazza)
• Very basic resistive circuit analysis:
        o   Ohm's Law http://en.wikipedia.org/wiki/Ohm's_law
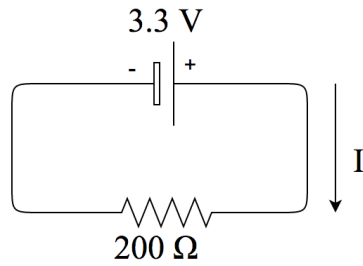   o   http://www.wikihow.com/Analyze-Resistive-Circuits-Using-Ohm%27s-Law

Acknowledgements
Portions of this assignment are borrowed from Professor Scott Hudson at CMU.

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[1] http://arduino.cc/
[2] http://www.processing.org/download/ (I recommend the stable release, 1.5.1)

1. What is the current [I], measured in mA?

3.3 V
− | +

I

200 Ω

2. What is the resistance [R], in Ohms?

3.7 V
− | +

100 mA

R
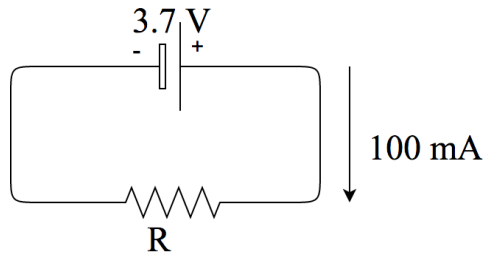
3. What is the resistance [R], rounded to the nearest Ohm?

5 V
− | +

160 mA

R
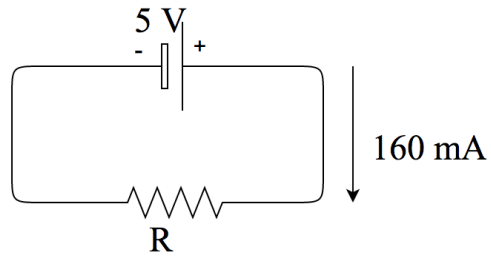
4. What is the current [I], in mA?

5 V
− | +

I

400 Ω   600 Ω

5. What is Vout, in volts?

400 Ω

5 V +
     −

400 Ω   Vout

6. What is Vin?

$250\,\Omega$

Vin

$750\,\Omega$
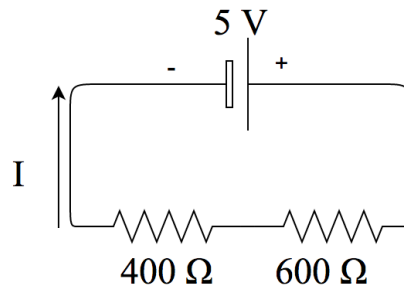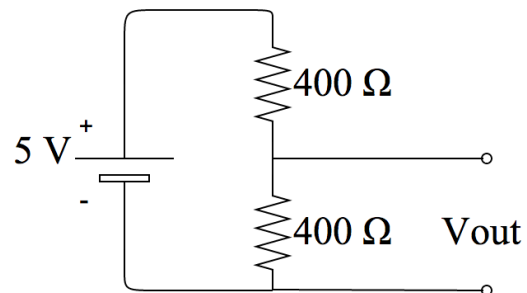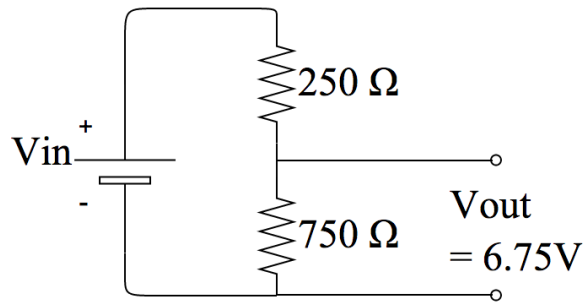
Vout
= 6.75V

7. If your variable resistance sensor R2 ranges from 0–200 Ohms, and you'd like your Vout to be between 0 and 5 volts, what value should you choose for R1, in Ohms?

9 V

R1

R2:
0-200 Ω
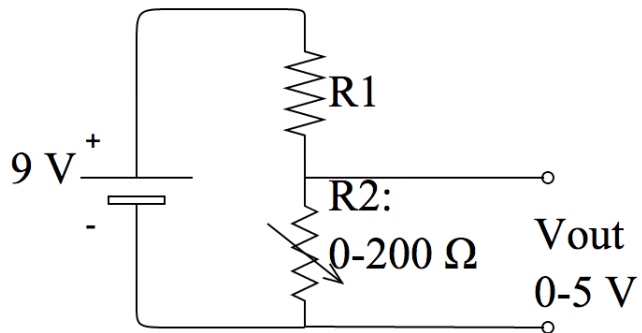
Vout
0-5 V

8. If your variable resistance sensor R2 ranges from 0–500 ohms, and you'd like your Vout to be between 0 and 3 volts, what value should you choose for R1?
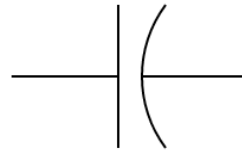
9 V

R1

0-500 Ω

Vout
0-3 V
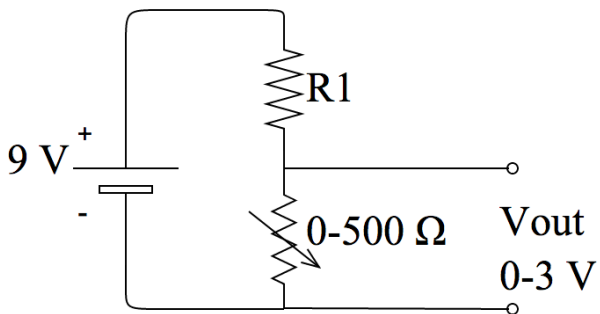
9. On a typical breadboard, point E will be electrically coupled to which other labeled points?
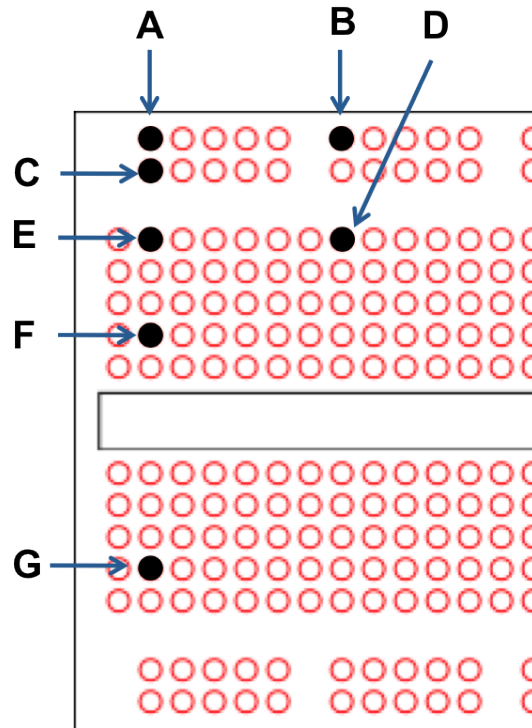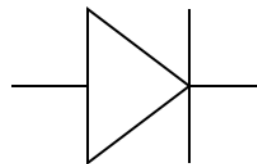
10. On a typical breadboard, point A will be coupled to which other labeled points?

11. This is the schematic symbol for what component?

12. This is the schematic symbol for what component?

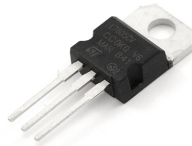13. This is the schematic symbol for what component?

14. What does this measure?

15. What is this?

Hint: the text on it reads:
L7805CV
CC0KQ V6
MAR 841

16. What is this?

17. A resistor has stripes colored, from left to right: brown, black, orange, gold. What is its resistance, in Ohms?

18. True or False: "I certify that I have installed Arduino and Processing on my machine, and the programs appear to open without error. Or, if there is an error, I have made the instructors aware of it via Piazza."

Finally, if you haven't already, please do the following:
1. Fill out the Course Survey at https://docs.google.com/spreadsheet/viewform?formkey=dHFEMHJ 4NHhPTm5IYXMzV2wyM0hDMGc6MQ
2. Ensure you're signed up for Piazza
3. Print out the lab agreement from http://www.cs.princeton.edu/courses/archive/spring13/cos436/ handouts/LabKitAgreement.pdf, sign it, and bring it to your next class or lab section.