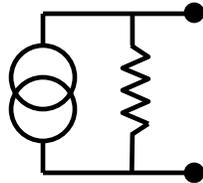
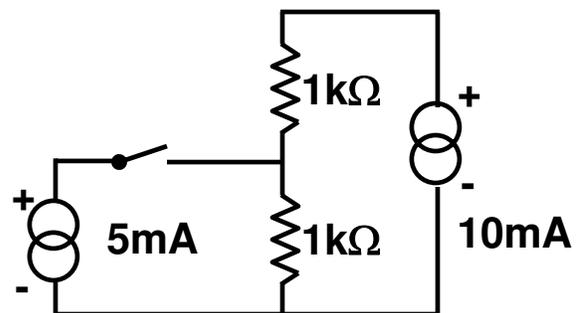
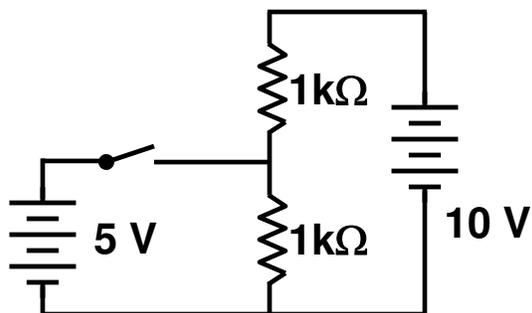


HW2, PHYSICS 127A, PART 1

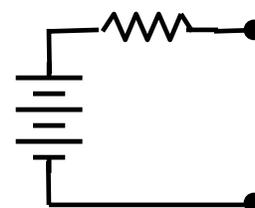
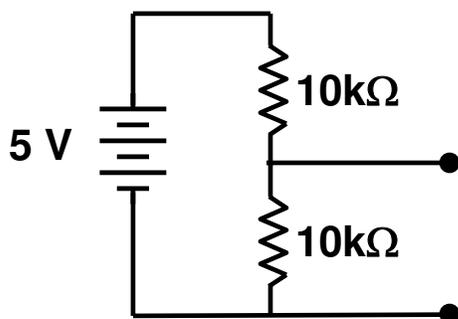
1. For the “black box” circuit of problem 5, last problem set, compute the output current and output resistance of the equivalent current source model.



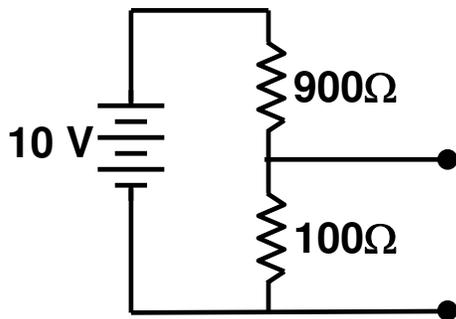
2. Compute the currents through and voltage drops across both resistors for the following circuits, with the switches both opened and closed. Note the different behavior for circuits with voltage or current sources.



3. Compute the following Thevenin equivalent circuit. For the nodes indicated by dots: (a) compute the voltage across the nodes, and (b) with a short placed across the nodes, compute the current through the short.



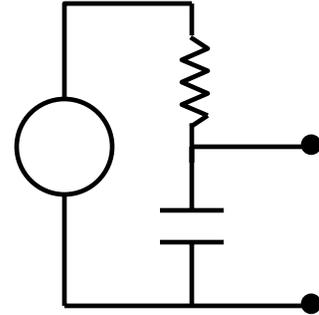
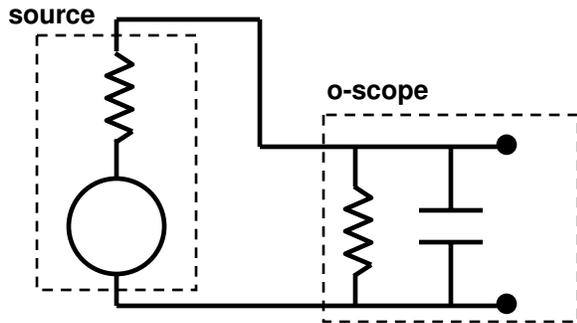
4. The following circuit is a 1.0 V voltage source. Using a Thevenin equivalent circuit, compute the output resistance of this voltage source.



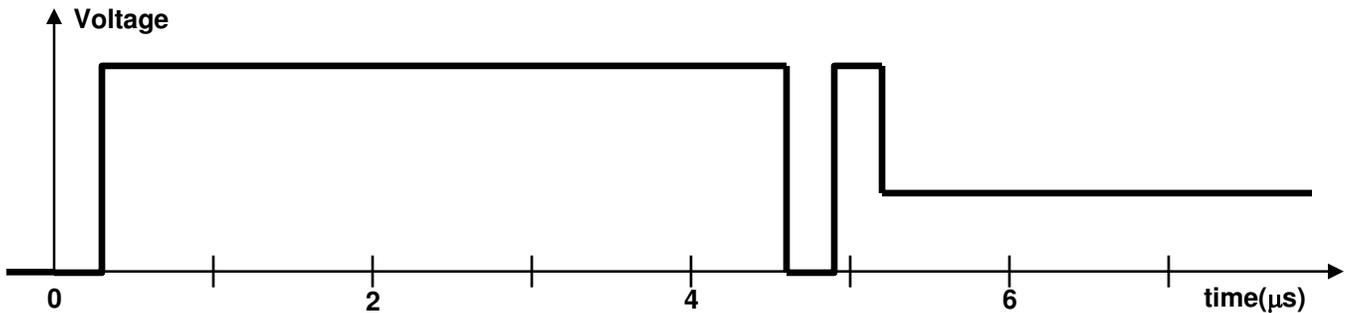
5. Horowitz and Hill (HH) exercise 1.8 (in text of chapter 1); building an I and V meter. In this problem, the coil in the $50 \mu\text{A}$ meter is made from very fine wire and has a resistance of $5 \text{ k}\Omega$. What is the input resistance of the 0-1 amp current meter and 0-10V voltage meter?

HW2, PHYSICS 127A, PART 2

1-2 . A voltage source $V(t)$ with $100\text{ k}\Omega$ output impedance is measured by your oscilloscope, which has an input impedance of $1\text{ M}\Omega$ and 10 pF . Label this circuit (1) and the simplified Thevenin equivalent circuit (2) that combines both resistors.

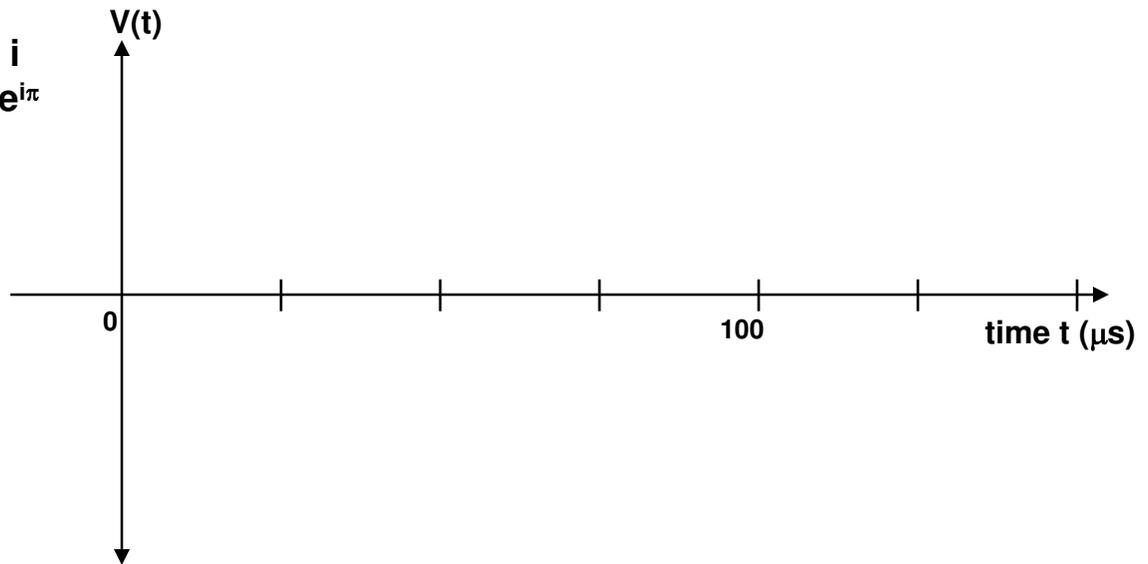


3. What is the RC time for this circuit? Sketch the oscilloscope waveform for the following input waveform $V(t)$.



4-6. Sketch the waveform $V(t)$ versus time t for the following 3 complex amplitudes A . Assume $V = \text{Re}\{Ae^{i\omega t}\}$ with a frequency $\omega/2\pi = 10$ kHz.

- (4) $A = 1$
- (5) $A = 1 + i$
- (6) $A = 0.5e^{i\pi}$



7. Describe the difference between a polarized (left) and regular (right) capacitor (see “Big Caps” on page 51 of lab manual). Capacitors with values over about 1 μF are usually polarized.

