Physics 1214, Homework #3 (due 9/12)

M1 Two identical metal rods are welded together end to end. If each rod has a length L and resistivity ρ, the resistivity of the combination will be

A. 4ρ.

B. 2ρ.

C. ρ.

D. $\rho/2$.

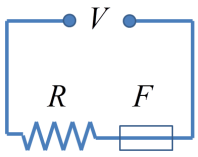
M2 Consider the circuit made of a $R = 100\ \Omega$ resistor, voltage source V, and fuse F. The fuse breaks if the instantaneous current in the circuit reaches 1 A. Which of the following voltage sources can be used in the circuit without breaking the fuse? Mark all possible choices.

A. 120 V direct current.

B. 80 V direct current.

C. 120 V alternating current (standard U.S. line).

D. 80 V alternating current.



Problems

P1 A potential difference of 10 V is applied to a copper wire of radius $r = 0.5$ mm and length $L = 1$ m. Find the power dissipated in the wire. The copper resistivity $\rho = 1.68 \times 10^{-8}$ Ω·m.

P2 The peak value of an alternating current in a 1500 W device is 3 A. What is the rms voltage across it?

P3 At \$0.12/kWh, what does it cost to leave a 25 W porch light on day and night for a year?

P4 A heater coil connected to a standard 120 V_{rms} ac line has a resistance of 36 Ω. What is the average power used?