In the interior of a metal in static equilibrium the charge density ρ is:

A. zero always.
B. never zero.
C. sometimes zero, sometime non-zero, depending on the conditions.

ANNOUNCEMENTS

- Homework 1 graded
  - Use GitHub Desktop to sync for feedback
  - Please come see me ASAP if you need help with GitHub
- Homework 2 posted; due Monday
- Quiz 1 on Friday
  - Last 20 minutes of class
  - No cheat sheets; all formulas will be provided
  - Solve a Gauss' Law Problem with spherical symmetry
  - Sketch a graph of the resulting electric field

Which of the following is a correct statement of charge conservation?

A. $\frac{dQ_{enc}}{dt} = -\int \mathbf{J} \cdot d\mathbf{l}$
B. $\frac{dQ_{enc}}{dt} = -\int \mathbf{J} \cdot d\mathbf{A}$
C. $\frac{dQ_{enc}}{dt} = -\int \nabla \cdot \mathbf{J}\, d\tau$
D. $\frac{dQ_{enc}}{dt} = -\nabla \cdot \mathbf{J}$
E. None of these or *more* than one of these

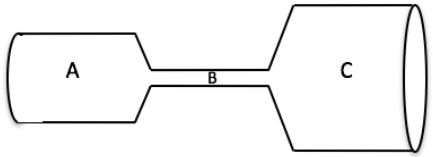
For everyday currents in home electronics and wires, which answer is the order of magnitude of the instantaneous speed of the electrons in the wire?

A. more than km/s
B. m/s
C. mm/s
D. μm/s
E. nm/s

An electric current I flows along a copper wire (low resistivity) into a resistor made of carbon (high resistivity) then back into another copper wire. In which material is the electric field largest?

A. In the copper wire
B. In the carbon resistor
C. It's the same in both copper and carbon
D. It depends on the sizes of the copper and carbon

Activity: A copper cylinder is machined to have the following shape. The ends are connected to a battery so that a current flows through the copper.



Rank order (from greatest to smallest, e.g. A=C>B)

Magnitude of E field, Conductivity, Current, & Current Density