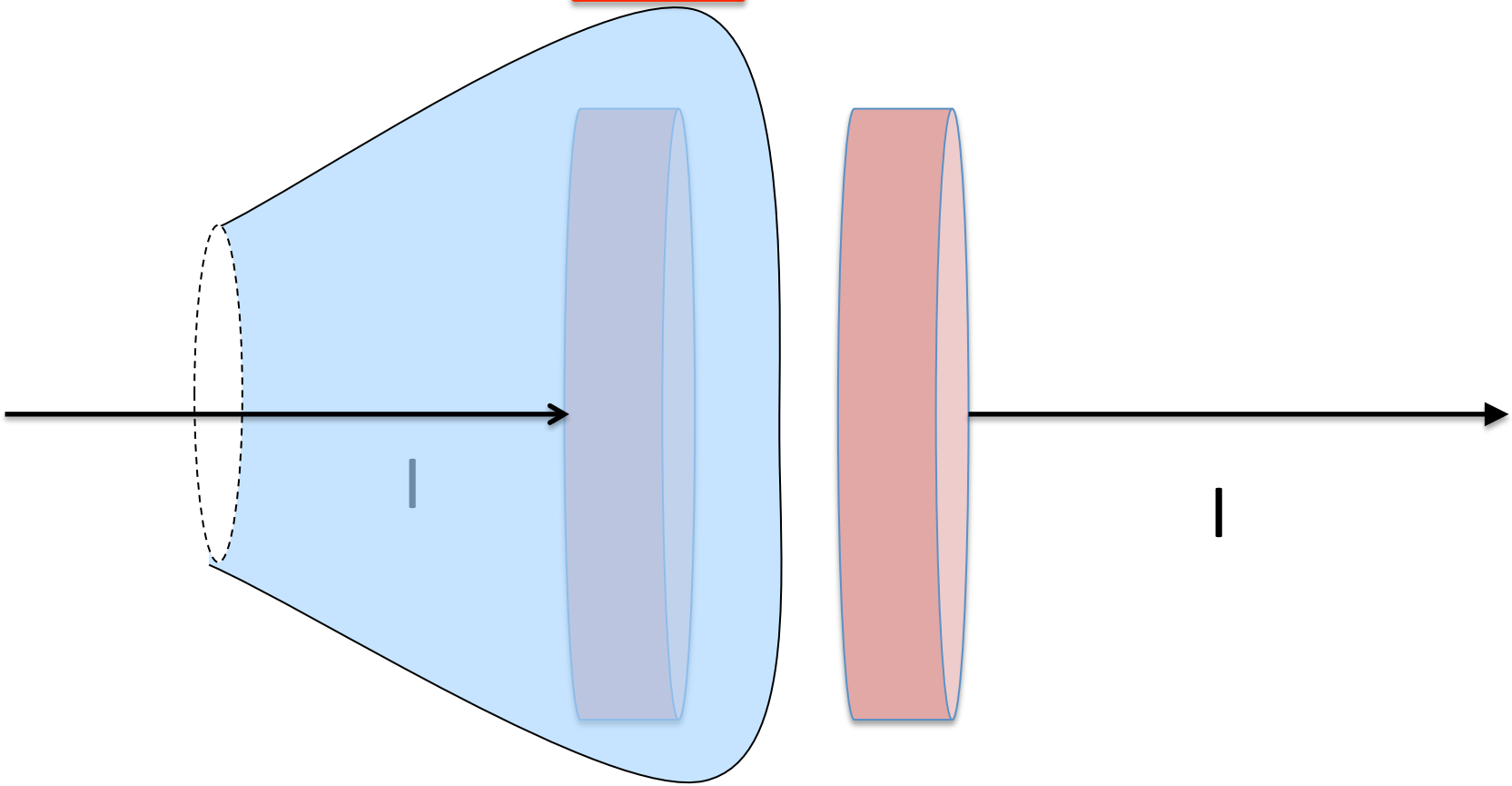
We are interested in B on the dashed "Amperian loop", and plan to use $\oint \vec{B} \cdot d\vec{l} = \mu_0 I_{thru}$ to figure it out. What is I_{thru}?

The surface over which we will integrate J·dA is shown in light blue. A) I B) I/2 **C) 0** D) Something else E) ??



8.3

Local conservation of electric charge is expressed mathematically by:

$$\frac{\partial \rho}{\partial t} = -\nabla \cdot \vec{\mathbf{J}}$$ where J is "current density"

$\mathbf{J} = \rho\mathbf{v}$ has units of (charge/sec)/m^2

We are trying to come up with a "conservation of energy" expression:

$$\frac{\partial(\text{energy density})}{\partial t} = -\nabla \cdot (something)$$

What sort of beast is this "something" ?
- Is it a scalar, vector, something else?
- How would you interpret it, what words would you use to try to describe it?
- What are its UNITS?

A) J B) J/s C) J/m^2 **D) J/(s m^2)**
E) Other!