Take a look at the activity we did back on Oct 9: Sjp08 energyflow
Think about why the various line integrals we considered must be zero, and then answer this:
What does this (zero line integral) tell us about the perpendicular and parallel components of the electric field outside the resistor?

The perpendicular component is non-zero and uniform, the parallel component points opposite to the parallel component in the resistor
The perpendicular component is zero, the parallel component points in the same direction to the parallel component in the resistor
The perpendicular component is non-zero and non-uniform, the parallel component points opposite to the parallel component in the resistor
The perpendicular component is non-zero and non-uniform, the parallel component points in the same direction to the // component in the resistor
Both components are zero
Something else entirely!

For an electromagnetic plane wave in free space, how do the directions of E, B, k & S compare to each other?

E is parallel to k, B is parallel to S, S is perpendicular to k
S is parallel to k, E is perpendicular to k and B, B is perpendicular to k
E is perpendicular to B, k is perpendicular to S
S is parallel to k and E, B is perpendicular to S
The directions have more "freedom" than the choices above suggest!

In class and in HW #8, we discussed how to use the complex exponential form of an E-field plane wave to calculate the Poynting vector, energy density, and intensity. This field is written as follows:

$$\tilde{\vec{E}}(x,y,z,t) = \tilde{\vec{E}}_0 \exp\left[i\left(\vec{k}\bullet\vec{r} - \omega t\right)\right]$$

Which of the following expressions do you use in computing the electric part of the energy density?

(1/2)ϵ_0(Re[E(x,y,z,t)])^2
(1/2)ϵ_0Re[(E(x,y,z,t))^2]
(1/2)ϵ_0|E(x,y,z,t)|^2
(1/2)ϵ_0(E(x,y,z,t))^2
None of these is appropriate/MORE than one could work/it's complicated!

How about the Intensity I? Hint: *E0* as given above is a *complex* quantity!

(1/2)cϵ_0 E_0^2
(1/2)cϵ_0 |E_0|^2
(1/2)cϵ_0 (Re[E_0])^2
(1/2)cϵ_0 Re[E_0^2]
None of these, more than one, or something else!

Optional: If you want to elaborate on any of the previous questions, please feel free.

Consider an electromagnetic wave traveling in vacuum with wavelength *λ*, angular frequency *ω*, electric-field amplitude *E0*. This wave is incident on a dielectric material with index of refraction *n*. Choose ALL the statements that that apply to this scenario:

The transmitted wave has a smaller wavelength than the incident wave
The transmitted wave has a frequency ω_T = ω/n
The amplitude of the transmitted wave is independent of the direction of the polarization of the incident wave.
The amplitude of the transmitted wave is independent of the direction of the k vector of the incident wave
There will always exist a Brewster's angle for the reflected wave, independent of the polarzation of the incident wave
The transmitted wave is always in-phase with the incident wave

For an electromagnetic plane wave in a good conductor, what is the relationship between the phase of E and the phase of B?

They are in phase
E leads B by 45 degrees
E lags B by 45 degrees
E leads B by 90 degrees
E lags B by 90 degrees
They are 180 degrees out of phase
Something else!

Optional: Comment on either of the above 2 questions.

If there is a time-dependent vector potential A, then we know that the E-field is no longer just -grad(V). In this situation, is the force on a charge q from such an E-field, F = qE, still conservative?

Yes
No
It depends

Elaborate on the previous question. if yes, how do you know? If not, what isn't being conserved? If it depends, what does it depend on (or can you think of different situations where it is /is not?)

To keep up with new stuff: Griffiths draws a donut on page 448 (Fig 11.4). What is this drawing trying to demonstrate?! He doesn't label the figure, so take your own shot: how would you briefly and clearly explain to a reader what is being shown here?