Classical Electrodynamics Quiz Ch I 2012/03/12

1. Using an appropriate Dirac delta function, please express *in spherical coordinates*, a three-dimensional charge distribution $\rho(\mathbf{x})$ which describes a uniform ring of charge of radius a with total charge Q located in the $x-y$ plane with the center of the ring at the origin.

2. If Φ is the potential due to a volume-charge density ρ within a volume V and a surface charge density σ on the conducting surface S bounding the volume V, while Φ' is the potential due to another charge distribution ρ' and σ', then

$$\int_V \rho\Phi' d^3x + \oint_S \sigma\Phi' da = \int_V \rho'\Phi d^3x + \oint_S \sigma'\Phi da \tag{1}$$

This is known as *Green's reciprocation theorem*. Can you verify it?

Best wishes, J.M. Nester