**Problem Set 1**  
**Phy 182 - Fall 2010**  
**Assigned: Wednesday, Sep. 1 Due: Friday, Sept. 10**

**Vector Calculus Problems**
Griffiths, 1.13, 1.16, 1.35 [Hint: use product rules 6 and 7 from inside cover], 1.38, 1.48.

**Dirac Delta Function in Spherical Coordinates**
Show that
\[
\delta^3(\vec{r}) = \frac{1}{4\pi r^2} \delta(r)
\]
by considering the integral \( \int d^3\vec{r} \delta^3(\vec{r}) f(\vec{r}) \) in spherical coordinates.

**Using Levi-Civita Symbol**
Using the Levi-Civita tensor, show that
a) \( \vec{\nabla} \times \vec{r} = 0 \),
b) \( \vec{\nabla} \times (\vec{\nabla} \times \vec{A}) = \vec{\nabla}(\vec{\nabla} \cdot \vec{A}) - \nabla^2 \vec{A} \).

**Electrostatics**
Griffiths, 2.5, 2.6, 2.9, 2.10.

Please write down how many hours you spent on this problem set.