Name: _____ PHYS 4031, FS 2018

Homework 1 **Due:** Start of class, September 7th

1. Griffiths Problem 1.4. **[3pts]**
   Hints: Two vectors specify a planar surface. The cross product between two vectors results in a third vector perpendicular to the first two.

2. Griffiths Problem 1.13 **[7pts]**
   Hints: Recall $\mathscr{r} = \sqrt{(x-x')^2 + (y-y')^2 + (z-z')^2}$. You can work these problems out for one component (e.g. $\hat{x}$) and generalize the result for the other two.

3. Griffiths Problem 1.15 **[3pts]**

4. Griffiths Problem 1.18 **[3pts]**

5. Griffiths Problem 1.26 (4th Edition; called 1.25 in the 3rd Edition) **[4pts]**

6. Griffiths Problem 1.30 (4th Edition; called 1.29 in the 3rd Edition) **[3pts]**

7. Griffiths Problem 1.31 (4th Edition; called 1.30 in the 3rd Edition) **[3pts]**
   Hints: The planar surface of a tetrahedron obeys $x + y + z = 1$, which is useful in setting up the limits for your integrals. You can do the integrals over various coordinates for the volume integral in any order you like.

8. Griffiths Problem 1.40 (4th Edition; called 1.39 in the 3rd Edition) **[4pts]**
   Hints: Remember the trick of u-substitution for integration. A hemisphere can be specified by two surfaces: The curved part has $r = R$, runs from $\theta = 0\ to\ \frac{\pi}{2}$, and has $d\vec{a} = R^2 \sin\theta\, d\theta d\varphi \hat{r}$ and the other is a flat face at from $\theta = \frac{\pi}{2}$ with $d\vec{a} = dr(r \sin\theta\, d\varphi)\hat{\theta}$.