Chemistry 20262 Spring 2018
Professor J. Daniel Gezelter Due Fri. 3/9/2018

Problem Set 6
(Vectors)

1. Let $\vec{u} = (2,1)$ and $\vec{v} = (-1,1)$. Find:
   - $u = |\vec{u}|$
   - $v = |\vec{v}|$
   - $\vec{u} + \vec{v}$
   - $2\vec{u} - 3\vec{v}$
   - $|\vec{u} + \vec{v}|$
2. McQuarrie, problem 13-4.
3. McQuarrie, problem 13-6.
4. McQuarrie, problem 13-11.
5. McQuarrie, problem 13-12. ($\vec{r} \times \vec{F}$ is the torque.)
6. McQuarrie, problem 13-14.
7. Extra Credit: Find three orthonormal vectors – that is, three vectors that are mutually perpendicular and have magnitude 1. Restrictions:
   - Don't use vectors parallel to the x, y, or z axes.
   - Don't use vectors that your classmates are using.

   You may use Mathematica for this, although it is not necessary to do so. Mathematica hints:

   ```
   u = {1, 2, 3}
   v = {4, 5, 6}
   ```

   creates vectors $\vec{u}$ and $\vec{v}$. You can calculate the dot product $\vec{u} \cdot \vec{v}$ and the magnitude $|\vec{u}|$ using these commands:

   ```
   u . v
   Norm[u]
   ```

   You may also want to investigate the `Cross[u, v]` command.