AEM 313 Problem Set #3

Due: 15th September 2017

1. Read AfE chapter 3 up to 3.12.3.
2. Watch "Vorticity Part 1" and "Vorticity Part 2" at http://web.mit.edu/hml/ncfmf.html.
   - Provide a **short** summary/abstract of these films. Concise, technical, and succulent.
3. Determine the vorticity field $\omega(x, y)$ of the following flow:

$$u(x, y) = y^2 + \cos(x)$$
$$v(x, y) = x + \sin(y)$$

4. For the following flow:

$$u_r(r, \theta) = \frac{\Lambda}{2\pi r}$$
$$u_\theta(r, \theta) = \frac{\Gamma}{2\pi r}$$

   - Compute the circulation about a unit circle (i.e. circle of radius=1)
   - Compute the divergence about a unit circle
   - Where is this flow rotational? Where is this flow irrotational?