M598B: Hints for Homework Assignment 5

2. (a). For example, when $u = 1$, the curve is

$$x = (1 - v^2)/2, \quad y = v.$$  

One then can eliminate $v$ to form

$$x = (1 - y^2)/2,$$

which represents a parabola that opens to the negative $x$-axis.

4. This is an easy problem. The $\nabla^2$ is the Laplacian $\Delta$. You can find the answers in the lecture note of Friday Lecture 13.

5. This is similar to problem 4, but you need the spherical coordinates of Lecture 12 on Wed to get started.

7. Some answers might be very long.

10. Some answers might be very long. If you like, you may skip the calculation of $\text{curl } F$. 