MATH 462
Homework 2

The suggested problems will not be turned in, though I will be happy to answer any questions you have abut them or the required problems. The latter set of problems *will* be turned by (on Tuesday April 22nd) and graded. As always, you are encouraged to work in groups, but please make sure that you write up your own solutions. I need to mention that problems 2) and 3) in the required section were shamelessly stolen from Jason Cantarella's homework assignment. **This is an incomplete list of problems. I will add more soon.**

1 Suggested Problems

1. Shifrin: pg. 362 #1.
2. Shifrin: pg. 362 #2.
3. Shifrin: pg. 362 #3,

2 Required Problems

1. Look at the Statement of Grren's Theorem in Stewart's Calculus and marvel at the simplicity of the same theorem in Shifrin's book expressed in the language of differential forms. Marvel I say!
2. Find a potential function for the one-form $\omega = x \sin y \, dx + \left(e^y + \frac{1}{2}x^2 \cos y\right) \, dy$ in $\mathbb{R}^2$ (that is, find a function f so that $df = \omega$) or prove that no such function exists. (Hint: This is not a trick question.)
3. Let g be the map $g(u, v) = (\cos u, \sin u, v)$, which parametrizes the cylinder $\{x^2+y^2 = 1\}$ in $\mathbb{R}^3$. Let ω be the two-form $x^2 \, dx \wedge dz + y \, dx \wedge dy + e^z \, dy \wedge dz$. Compute $g^* \left(d\omega\right)$ by any means necessary. (Hint: This *is* a trick question.)