Information about the December exam

1. When December 8 , Time TBA
2. Where TBA
3. What is covered? Everything in the entire semester, however 3/4 of the exam will be on material covered since the midterm exam. There will be an elementary question using stokes theorem.
4. How many problems? There will be nine problems with subparts.
5. What to bring to the exam? Just yourself and pen or pencil, no cell phones, wifi devices etc.. I will allow calculators (GOLD STICKER or Casio 991 ONLY).
6. How to study? Material and examples from lecture notes, suggested problems, homework problems and tutorial questions should be used as study guide.
7. Will there be proofs? No proofs like epsilon-delta or establishing any of the theorems or corollaries we studied in class, but you have to know statements of theorems and how to apply them. Class notes are a very good sketch of the style and content of the questions and responses which I can expect from you. You should also know what the definition of differentiability is and what you need to check to determine if functions is differentiable at a point. You should be able to check whether vector fields are gradient, or irrotational, or incompressible. You will also be expected to make conclusions from some of the theorems we covered in class, examples: mixed partial second order derivatives with continuous second order partials are equal; differentiability implies continuity; continuous partials implies differentiability, Greens Theorem, Divergence Theorem, Stokes theorem.
8. What will the exam be testing? Mostly understanding together with geometric and vector analytic reasoning. Vector fields and various properties, for example independence of path. Also covered will be technical skills for understanding integration on curves and surfaces, circulation of vector fields, and flux of vector fields across surfaces. You should know that divergence and curl can be computed in different coordinate systems, rectangular, cylindrical and spherical. However I wont expect that you remember the formulas for $\vec{\nabla}$ in these different coordinate systems. You should be comfortable with various expressions involving matrices and vectors, cross products and dot products, divergence and curl in rectangular coordinates, chain rule in its many different manifestations, parametric equations, planes and normals in

all dimensions, gradients, derivatives and implicit functions. Two formulas which might be on the exam!

$$\cos^2(t) = \frac{1}{2} + \cos(2t), \quad \sin^2(t) = \frac{1}{2} - \cos(2t)$$

I will update this page as new information becomes available.