Review Sheet for Final Exam

Standard disclaimer: The following represents a sincere effort to help you prepare for our exam. It is not guaranteed to be perfect. There might well be minor errors or (especially) omissions. These will not, however, absolve you of the responsibility to be fully prepared for the exam. If you suspect a problem with this review sheet, please bring it to my attention (bounty points are possible).

Review: There will be a review session Wednesday May 6 from 7-9 PM in 229 Hayes-Healy.

Time and place: the exam will take place Thursday, May 7 4:15-6:15 in 229 Hayes-Healy. All of the material covered on homework this semester is fair game. In particular, there will be questions about integration of differential forms and Stokes Theorem.

Ground Rules: the exam is closed book and no calculators are allowed. All you'll need are sharp pencils and a good eraser. No pens please!

Format: Similar to other exams.

Specific topics (beyond those covered on the midterms):

Definitions and statements: *linear/differential k-form*; *parametrized k-dimensional manifold*; *Stokes Theorem*; perhaps also the restatement of the change of variables theorem using pullback of an n-form.

Computational/proof skills: Manipulating differential forms (by e.g. wedge product, pullback, exterior derivative); Computing the integral of a differential form over a parametrized k-dimensional manifold in $\mathbf{R}^n$ ($k \leq n \leq 3$); using Stokes Theorem. Perhaps it will also help to recognize when an integral vanishes because e.g. symmetry or some relevant variable is constant. Know how to prove that the integral of differential form does not change under orientation preserving reparametrization.

Editorial Comment: A line integral is just a special cases of the integral of a differential k-form over a k-dimensional manifold. The fundamental theorem of calculus for curves and Green's Theorem are both special cases of Stokes Theorem.