

# Math 261 Final Exam Review Sheet

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**WARNING:** I do not guarantee that this is a comprehensive list! Be sure to review your course notes and the suggested homework, too. Also, there could be typos – beware!

**Structure of the final exam:** The final typically has 4 or 5 problems from the post-Exam 3 material, constituting roughly 50% of the points given in the exam. The remaining half will be based on the most important concepts and ideas from older material.

**What is excluded?** Everything that was excluded from the midterms (e.g. 3D substitution, sketching for points, etc.). Also, don't worry about the implicit form for surface integrals – we will do everything in the parameterized form.

**Impact of your Final Exam grade:** At 200 points, the final exam accounts for a third of your course grade (total of 600 points). Try your best; grades can go significantly up or down based on your performance on the final exam.

## **Topics since Exam 3:**

(see old review sheets for older topics that could appear since the final is cumulative)

- Conservative v.f.: Know the component test, how to find the potential function, and how to evaluate the line integral of a vector field by evaluating the potential function.
- Green's theorem in the plane (2-D problems): Green's theorem (two, actually – one for circulation and one for flux) lets you turn line integrals along planar curves into double integrals over the interior of the curves. Know how to apply these two theorems to find circulation and flux. Similarly, know how to use these theorems (either version) to convert integrals in one form into the other form.
- Surfaces and area: Know how to parameterize fairly basic surfaces (spheres, cones, planes, cylinders) and those given in the form  $z = f(x, y)$ . Any complicated parameterizations will be provided, as will any complicated figures. Ignore implicitly-defined surfaces (though you are welcome to make use of that knowledge if you have it). Know how to compute surface area. (See the formula sheet!)
- Surface integrals: Know how to integrate a function over a surface. Know the parameterized form; ignore the implicit form. Know how to compute mass and moments of "thin shells." (The integrands are the same as always for moments and masses, but now you do surface integrals – not a big difference.)
- Stokes' theorem: On the formula sheet. Know how to set up both sides of the equation in the theorem (one line integral along the boundary of a surface; one surface integral).
- Divergence theorem: On the formula sheet. Know how to set up both sides of the equation in the theorem (one surface integral; one triple integral over a solid).