

MATH 251 section 502, Fall 2010, Final TEST coverage

Calculators are OK, but not necessary. There will be 10 or 12 problems for a maximal score 150 pts. For full credit you need to show the whole work.

The problems are aimed to test your knowledge (definitions and main results), understanding of the material (main mathematical ideas and techniques) and some basic applications. The test will be based on your homework assignments. It will cover the material of the whole course, but would not be much different from the other tests.

In particular the problems will cover the following material:

1. Vectors in 2 and 3 dimensions. Dot and cross-products, properties, applications.
2. Equations of lines and planes in 3-D. Tangent planes and normal lines. Quadric surfaces: identification, characterization, intersections.
3. Vector functions and space curves: derivatives, integrals. Arc length and curvature (tangential and normal vectors).
4. Functions of many variables, limits and continuity (a **must**). Partial derivatives, chain rule. Directional derivatives and gradient vectors.
5. Local extrema of functions of 2 variable. Critical point, saddle point. Absolute minimum and maximum values. Method of Lagrange multipliers for minimizing or maximizing a function subject to constraints (this whole part is an absolute **must**).
6. Double integrals over rectangle, iterated integrals, Fubini's theorem. Triple (volume) integrals.
7. Vector fields in 3-D, conservative vector fields, line integrals of functions (of two and three variables) and application and line integrals of vector fields (a **must**).
8. Surface area and surface integrals of functions. Surface integrals of vector fields (a **must**).
9. Differential operators over vector fields, **curl**, **grad**, and **div**, and their properties.
10. Green's Theorem and applications (this is an absolute **must**).
11. Stokes' Theorem and applications (a **must**).
12. Divergence Theorem (**must**).
13. Good luck.