Fall 2017 Math 211 Final Exam Topics

The exam will take place 9am-noon on Friday, Dec 22 in Paino Hall. You will not be allowed use of a calculator or any other device other than your pencil or pen and some scratch paper. Notes are also not allowed. In kindness to your fellow test-takers, please turn off all cell phones and anything else that might beep or be a distraction.

- Elementary vector analysis:
  - Dot and cross products
  - Lines and planes
  - Parametric equations for curves, including lines and circles
  - Differentiation of vector-valued functions
  - Tangent vector to a parameterized curve

- Functions of several variables:
  - Limits and continuity for functions of 2 variables
  - Differentiability
  - Partial derivative
  - Directional derivative
  - Gradient and its importance (points in direction of greatest increase), and its relation to level sets (gradient perpendicular to level curve or surface)
  - Tangent plane to a surface
  - Linear approximation to a function of 2 or more variables

- Maxima and minima of functions of several variables:
  - Finding critical points
  - Second Derivative Test for local extrema and saddle points
  - Method of Lagrange multipliers for one constraint
  - Finding absolute max and min on a closed bounded region

- Double integrals:
  - Iterated integrals (Fubini's Theorem)
  - Cartesian and polar coordinates
  - Finding area of a region in the plane, surface area, and volume
  - Change of variables for double integrals

- Triple integrals:
  - Cartesian, cylindrical and spherical coordinates
  - Computing volume

- Line integrals of scalar functions and of vector fields along a curve:
  - Basic computation
  - Fundamental Theorem of Line Integrals
  - Properties of gradient (conservative) fields
  - Green's Theorem

Review each of these topics (skim lecture notes and textbook, rework homework problems, exam review problems, and in-class exams). When you feel ready, take the practice exams posted on the course webpage, working through as many as possible—working lots of problems is the best practice! There are also past years' exams available at https://www.amherst.edu/academiclife/departments/mathematics-statistics/resources-opportunities/mathfinals. Skip any problems on past exams on topics we aren't covering on our current final exam.