

Midterm I Study Guide

Math 20

March 2, 2005

These are some of the things you should be able to do. This is not to say the the test will ask you to do these things!

- Vector algebra:
 - Add two vectors.
 - Subtract a vector from another vector.
 - Multiply a vector by a scalar.
- Draw vectors in the plane and (sort of) in \mathbb{R}^3 .
- Use vectors to model commodity bundles and price vectors.
- Find the scalar (dot) product of two vectors.
- Know the properties of the dot product—how it distributes over addition and scalar multiplication.
- Use the dot product to project a vector onto the line spanned by another vector.
- Use the dot product to compute the length of a vector.
- Use the dot product to find the angle between two vectors.
- Find the matrix of a linear transformation given a description of the linear transformation.
- Add, scale, and multiply matrices.
- Graph a function of two variables using traces (**Note:** This is not an art class, so don't sweat this point too much.)
- Make a contour plot of a function of two variables.
- Show that the limit of a function at a point does not exist.
- State the definition of the partial derivative of a function.
- Compute partial derivatives of multivariable functions.

- Find the critical points of a function of several variables.
- Find the Hessian matrix of a function at a point.
- Find and classify critical points of functions of two variables.
- Use Lagrange Multipliers to solve constrained optimization problems.
- Find the maximum and minimum values of a function on a region with boundary.

Problems

In lieu of practice problems I have given you goals to guide your studying. To find problems that test your mastery of these goals, besides those in our own books, you can consult some of the textbooks in Cabot Science Library's Textbook Reference section. As you enter Cabot and walk past the circulation desk, it's the first set of shelves on the left. Any multivariable calculus book or any linear algebra book should have something about these topics.