

Basic skills list for Midterm Two in Math 126

The following is a collection of some of the things you are expected to be able to do on the second midterm. It is intended as a starting point, not as a comprehensive summary of the material. You are also expected to be able to combine these skills to solve more complex problems such as those that appeared in the assigned homework.

1. Functions of Several Variables

You should be able to:

- (a) Find, describe and sketch the domain of a given two variable function
- (b) Sketch and interpret level curves and contour maps of a given two variable function
- (c) Find the partial derivatives f_x , f_y , f_{xx} , f_{xy} , f_{yx} , and f_{yy} of a given two variable function $f(x, y)$, including by implicit differentiation
- (d) Find the equation of a tangent plane
- (e) Use linear approximation to approximate the value of a two-variable function
- (f) Find and classify all critical points of a function of two variables using the Second Derivative Test
- (g) Find global optima of a two-variable function on a closed region
- (h) Solve applied optimization problems involving functions of two variables

2. Multiple Integrals

You should be able to:

- (a) Approximate double integrals using Riemann sums
- (b) Express the volume beneath a surface $z = f(x, y) > 0$ over a region R in the plane as a double integral
- (c) Evaluate double integrals over general regions
- (d) Reverse the order of integration to evaluate a double integral
- (e) Use polar coordinates to evaluate double integrals (this includes finding areas of planar regions)