MATH 2110Q
Fall 2010
Sarah Glaz

Exam 2 Guidelines: Material and Review Suggestions

Date and place: Tuesday, November 9, in class
Additional office hours before exam: Monday, November 8, 1:00 – 2:00
Policies: No MAKE-UPS.
This is a one-hour exam, but all students may stay for as long as they need to finish the exam.

Material:

- Chapter 14: sections 14.1, 14.2, 14.3, 14.5, 14.6, 14.7 and chapter 15: sections 15.1, 15.2, 15.3
- Homework points total = 13 points (1 point per each section, group-work, and review of integrals)
- Exam 1 total points = 87 points
- You may bring a Scientific Calculator (but not a programmable or symbolic calculator)
- You may bring: The review of Calculus I, II packet handout
  The double integration handout
- You may not bring any other notes or handouts

The exam will cover the material from chapter 14: sections 1-3, and 5-4, and chapter 15: sections 1-3 that we discussed in class and studied in the homework assignments. Material from previous chapters may be needed to answer questions from these sections. Suggested review: The REVIEW QUIZ, EXERCISES, and CONCEPT CHECK at the end of each chapter (only those exercises that are on the material we studied in class), and exercises in the same groupings as those assigned as homework problems.

Section by section highlights you should master:

Chapter 14

Section 14.1
Concepts: Functions in two or three variables, domain, range, graph, level curves, level surfaces
Skills: Draw level curves of functions in two variables and use them to draw or visualize the surface defined by this function

Section 14.2
Concepts: Limits of functions in two or three variables, continuity of functions in two or three variables
Theorems and formulas: Limit rules, list of continuous functions
Skills: calculate limits of functions in two variables, guess when a rational function has no limit and show it, decide at which points functions in two variables are continuous

Section 14.3
Concepts: partial derivatives (first and second order) of functions in two or three variables, mixed second order partial derivatives
Theorems and formulas: partial derivatives formulas, when are the second order mixed partials equal
Skills: Calculate partial derivatives of functions in two or three variables

Section 14.5
Concepts: the chain rule
Theorems and formulas: The chain rules for various cases (box 2 on pag 901, box 3 on page 903, box 4 on page 904)
Skills: Use the chain rule to calculate partial derivatives

Section 14.6
Concepts: directional derivatives, gradient, rate of change of a surface in the direction of a vector, tangent plane or normal line to a level surface at a point on the surface
Theorems and formulas: Directional derivatives (box 2 on page 911, box 11 on page 914), the gradient (box 8 on page 913, box 13 on page 915), the formula for directional derivative (box 9 on page 913, box 14 on page 915), direction and rate of maximal change of a surface described by a function in two variables (Theorem 15, on page 916), the equations of tangent planes and normal lines to a level surface (best described on the handout given in class)
Skills: Calculate directional derivatives, gradients, direction and rate of maximal change, tangent planes and normal lines to level surfaces.

Section 14.7
Concepts: critical points, local and absolute minimum and maximum, and saddle points of functions in two variables
Theorems and formulas: Critical points (Theorem 2 on page 923), second derivative test (box 3 on page 925), algorithm for finding absolute extrema (box 9 on page 929)
Skills: for functions in two variables find critical points and decide, using the second derivative test, which are a minimum, maximum, or saddle points; find the absolute minimum and maximum of a function in two variables on a closed and bounded domain

Chapter 15

Section 15.1
Concepts: The double integral over a rectangle
Theorems and formulas: definition of a double integral over a rectangle (box 5 on page 953), properties of the double integral (unnumbered box at the bottom of page 953, formulas 7, and 8 on page 958, the double integral as area (handout)
Skills: Calculate simple double integrals over rectangles in cases they are volumes and areas

Section 15.2
Concepts: Iterated integrals
Theorems and formulas: Fubini's Theorem (Theorem 4 on page 961)
Skills: Calculate double integrals over rectangles using Fubini's Theorem

Section 15.3
Concepts: Double integrals over a general region
Theorems and formulas: The definition of the double integral over a general region (box 2 on page 966), Fubini's Theorems for the two types of general region (Boxes 3 and 4 on page 967), rules of integration (boxes 9 and 10 on page 971, and the double integral handout)
Skills: Calculate double integrals over general regions of both types (using Fubini's Theorem), switch order of integration for regions that can be described in both types