MATH 2110Q Fall 2010
Sarah Glaz

Final Exam Guidelines: Material and Review Suggestions

Date and place: Tuesday, December 14, 10:30 – 12:30, MSB 315
Additional office hours before the final exam: Monday, December 13, 5:00 – 6:00
Policies: Any MAKE-UPS for final exams must be authorized by the office of student services.
This is a one-hour exam, but all students may stay for as long as they need to finish the exam.

Material:

- Retested Material: Chapter 15: 15.1, 15.2, 15.3
  New Material: Chapter 15: 15.4, 15.6, 15.7, 15.8; and Chapter 16: 16.1, 16.2, 16.3, 16.4
- Homework points total = 10 points (1 point per each section of new material, and group-works)
- Final Exam total points = 90 points
- You may bring a Scientific Calculator (but not a programmable or symbolic calculator)
- You may bring the following three handouts: The review of Calculus I, II packet; The double integration Handout; and The triple integration handout.
- You may not bring any other notes or handouts

The exam will cover the material from chapter 15: sections 1-4 and 6-8, and chapter 16, sections 1-4 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 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

Section 15.4
Concepts: Polar coordinates
Theorems and formulas: relation between cartesian coordinates and polar coordinates (unnumbered box on page 974 and handout), change from cartesian to polar coordinates in a double integral (box 2 on page 975 and handout)

Skills: convert points and graphs from cartesian to polar coordinates and the other way around, convert double integrals from cartesian to polar coordinates, calculate double integrals in polar coordinates.

Section 15.6
Concepts: Triple integrals
Theorems and formulas: Fubini's Theorem for triple integrals over a box (Theorem 4 on page 991), triple integrals over bounded solids E of the three types (type I: box 6 on page 992; type II and III: formulas 10 and 11 on page 993), the triple integral as the volume of a solid (box 12 on page 995)
Skills: Calculate triple integrals over solids of type I, calculate volumes of solids using triple integration

Section 15.7
Concepts: Cylindrical coordinates
Theorems and formulas: relation between cartesian coordinates and cylindrical coordinates (boxes 1 and 2 on page 1001 and handout), change from cartesian to cylindrical coordinates in a triple integral (box 4 on page 1002 and handout)
Skills: Describe type I solids in cylindrical coordinates, convert points and graphs from cartesian to cylindrical coordinates and the other way around, convert triple integrals from cartesian to cylindrical coordinates, calculate triple integrals in cylindrical coordinates.

Section 15.8
Concepts: Spherical coordinates
Theorems and formulas: relation between Cartesian, cylindrical and spherical coordinates (boxes 1 and 2 on page 1006 and handout), change from cartesian to spherical coordinates in a triple integral (box 3 on page 1008 and handout)
Skills: Describe type I solids in spherical coordinates, convert points and graphs from cartesian to spherical coordinates and the other way around, convert triple integrals from cartesian to spherical coordinates, calculate triple integrals in spherical coordinates.

Chapter 16

Section 16.1
Concepts: vector field, on R^2 or R^3, gradient vector field, conservative vector field, potential function
Skills: Calculate the gradient vector field of a function in two or three variables

Section 16.2
Concepts: line integral, work
Theorems and formulas: definition of a line integral (box 13 on page 1042), the other way of viewing a line integral (unnumbered box on page 1043), line integral as work (remarks on page 1041 and your classroom notes), properties of line integrals ("Note" on page 1042, and your classroom notes)
Skills: Calculate work and line integrals

Section 16.3
Concepts: The Fundamental Theorem of Line Integrals (FTLI), independence of path
Theorems and formulas: The Fundamental Theorem of Line Integrals (FTLI) (Theorem 2 on page 1046), Determination of when is a vector field on R^2 conservative (Theorems 5 and 6 on page 1049),
Skills: Determine if a given vector field on R^2 is conservative and if it is conservative find its potential function, use FTLI to calculate line integrals of conservative vector fields.

Section 16.4
Concepts: Green Theorem
Theorems and formulas: Green Theorem (unnumbered box on page 1055), line integral as area of region in the plane (box 5 on page 1058)
Skills: use Green theorem to calculate double integrals, use Green Theorem to calculate line integrals, calculate areas using line integrals