Mathematics 112/112Z
Fall, 2004

Textbook: Larson, Hostetler and Edwards, <u>Calculus of a Single Variable</u>: Early Transcendental Functions, D.C. Heath and Company, 3rd edition

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Content: Mathematics 112 is the second semester of calculus and is designed specifically for students who have completed a semester of college calculus (Math 111, Math 111Z, Math110B, or AP Calculus). Course content includes methods of integration, improper integrals, polar coordinates, sequences and infinite series, power series, and introduction to differential equations. Specific topics by class day are attached.

Goals: At the completion of the class, students should have (1) a basic understanding of derivative, of antiderivative, and of limit; (2) a basic understanding of power series and be able to determine the domain of appropriate power series. Students should also be able to (1) use the rules of differentiation as they apply to algebraic and transcendental functions; (2) evaluate a variety of limits; (3) sketch graphs of transcendental functions by building on concepts from Calculus I; (4) demonstrate appropriately the methods of integration (substitution, integration by parts, trigonometric substitution, partial fractions) and use these methods with typical indefinite, definite, and improper integrals; (5) graph and find area using simple polar coordinate expressions; (6) determine convergence of appropriate infinite series by giving logical arguments; (7) derive a power series expression for certain transcendental expressions using a geometric series or Taylor's Theorem; (8) use technology to produce appropriate graphs of variations on functions typically used in this course; (9) solve simple first-order differential equations.

Attendance: The student is expected to attend all classes since the student is responsible for work covered in class and for any announcements made in class. An inordinate amount of absences will be handled in accordance with school policies.

Homework: Specific topics included in this course are attached. Although homework assignments are not collected, it is important that the student successfully complete the problems assigned.

Students will need to spend at least 2 productive hours of study for each class session, or 6 to 8 hours per week. Students should not get behind or wait until the night before a test to study. Sleep is important prior to tests.

Quizzes: All quizzes are announced and "take home"; however, the student <u>must</u> be present in class to receive the quiz. The student <u>must</u> work each quiz at one sitting and use only the reference sheet provided for this course. There should be no discussion of quizzes until after they are turned in for grade. Quizzes are due at class time on the class day indicated on the assignment sheet. Each quiz is worth 25 points and the best five quizzes will be used to help determine the student's grade.

Major Tests/Final Exam: Four major tests will be given. The final exam will be comprehensive and will be given according to the final exam schedule.

Each student is expected to take tests at the scheduled times. Any conflicts or problems will be handled on an individual basis. If the excuse is considered legitimate by your instructor, arrangements will be made to take a test on the afternoon **prior to** the testing time. Emergencies will be handled on an

individual basis. Documented special accommodations for test taking must be cleared several days prior to the test date so that appropriate arrangements can be made.

Computer Portfolio: Using Graphmatica, the student is to prepare a portfolio of computer printouts showing a minimum of twelve (and maximum of twenty) distinctly different pages of graphs. Each function needs to be clearly identified. The student must give the important aspects of graphing by labeling these aspects on no fewer than three graphs. In addition to the required or technical graphs, the student should compose functions to produce pictures illustrating a theme or a story for a second set of graphs, the thematic graphs. Each portfolio should include a variety of functions (algebraic, transcendental and Polar Coordinates). Accuracy, clarity, organization, and originality are important in your portfolio. Students will present the portfolios on the due date. Students should not wait until the end of the semester to do this project. Use your time wisely throughout the semester. Examples of previous portfolios can be seen in the instructor's office during office hours.

Gateway Exam: In order to pass Math 112, the student must pass a Gateway exam. This exam is made up of eight problems as follows: two limits to evaluate (at least one requiring L'Hospital's Rule), two differentiation problems (any transcendental function may be included), and four integration problems (one needing u-substitution, one needing trigonometric substitution, one needing integration by parts, and one needing partial fractions). To pass this test, a student must work at least six problems correctly. Points will be earned as follows:

all eight problems correct	75 points
seven problems correct	65 points
six problems correct	50 points

Calculators: Calculators will **not** be allowed on tests or quizzes.

e-Reserves/WebSite: The student is responsible for obtaining the handouts on e-Reserves through the library web page. Handouts include information and exercises to supplement the textbook.

In addition, there is a Graphing Tutorial at the following web site, which is accessible through e-Reserve:

http://www.oxford.emory.edu/OXFORD/RESTRICTED/UNIVERSITY/Classes/Chen/Calculus/Index.htm

Learnlink: There is a class conference on Learnlink, **Math112 Fall2004**. Announcements, scheduled SI sessions, questions related to problems, and other information can be posted at any time. Students may ask questions and make requests of a general nature on this conference. Individual concerns should be sent directly to your professor. Students should place this conference on their desktop and check frequently.

Grading: The final course grade will be determined as follows:

Major tests (4 @ 100 points)	400 points
Quizzes (best 5 @ 25 points)	125 points
Graphing Portfolio	150 points
Gateway Test	75 points
Final Exam	250 points
TOTAL	1000 points

In general,

A, A-: 900 points and above
B+, B, B-: 800-899 points

C+, C, C-: 700-799 points
D+, D: 600-699 points
F: below 600 points

<u>Tutoring and Supplemental Instruction:</u> Student tutors will be available to help with homework problems. A schedule giving specific times will be available after the first week of classes. Tutors will be located in the Gregory room during the hours posted.

The SI leaders for Math 112 are **Jacob Ensign** and **Huan Yan**. They schedule study sessions to review calculus concepts, to help students discover how best to study calculus, and (if needed) to orient students to the use of computers in the laboratory. Check the course conference on Learnlink for announcements.

Written Style: Neatness is one way of showing courtesy toward your instructor and pride in your work. Thoughts in mathematics are expressed in sentences, such as "1 + 1 = 2". There is a subject "1 + 1", a verb "=", and a predicate "2". The student should strive to be neat and to use mathematical symbols appropriately.

THE HONOR CODE OF OXFORD COLLEGE APPLIES TO ALL WORK SUBMITTED FOR CREDIT IN THIS COURSE. BY YOUR SIGNATURE ON SUCH WORK YOU PLEDGE THAT WORK WAS DONE IN ACCORDANCE WITH THE RULES STIPULATED ON THE WORK OR IN THIS SYLLABUS.

Tentative Calendar of Topics and Homework Assignments (Subject to Adjustments)

Wednesday, August 25   Review functions, limits
e-Reserve: Introductory Topics
Textbook:
        p. 45: 91, 95, 107, 111
        p. 54: 25, 35
        p. 83: 7, 13, 15, 19, 31
        p. 94: 1-6, 7, 9, 11, 17, 25
        p. 95: 41, 45, 51, 55

Friday, August 27   Review functions, limits
e-Reserve: Introductory Topics
Textbook:
        p. 106: 15, 17, 19, 21, 23, 37, 39, 41, 55
        p. 237: 13, 15, 17, 19

Monday, August 30   L'Hôpital's Rule (Section 7.7)
Wednesday, September 1
e-Reserve: Introductory Topics
Textbook:
        Study Section 7.7
        p. 537: 5-35 odd

Friday, September 3   Differentiation
e-Reserve: Introductory Topics
Textbook:
        Study Table on page 173
        p. 143: 23-53 odd
        p. 156: 9-35 odd, 55-93 odd
        p. 166: 1-19 odd
        p. 173: 13, 17, 19
        p. 191: 67-91 odd, 119 – 125 odd
        QUIZ 1

                        Labor Day   Monday, September 6

Wednesday, September 8   Graphing polynomials, rational functions
e-Reserve: Graphing Segment 1
Calculus Page: Graphing Tutorial, access via e-Reserve

Friday, September 10   Graphing logarithmic and exponential functions
e-Reserve: Graphing Segment 2
Monday, September 13   Review integration
e-Reserve: Integration; Math112 Reference Sheet
Textbook:
        p. 331: 11, 17, 21, 29, 33, 47, 49, 53, 57, 59, 65, 67, 93, 97, 103, 105
        p. 348: 3, 5, 7, 9, 17, 27, 31

p. 355: 1, 5, 13, 19, 21, 23, 25, 27, 29, 31, 33, 37, 41
p. 486: 7, 13, 15, 23, 27, 37, 39, 47, 53
QUIZ 2

Wednesday, September 15   Integration by Parts
<u>e-Reserve:</u> Integration
<u>Textbook:</u>
  Study Section 7.2
  p. 494: 5, 7, 9, 11, 17, 21, 27, 29, 33, 35

Friday, September 17   More Substitution
<u>e-Reserve:</u> Integration
<u>Textbook:</u>
  Study Section 7.3
  p. 503: 3 – 15 odd, 21-37 odd, 61-67 odd

Monday, September 20   Review for Test 1
<u>e-Reserve:</u> Review for Test 1

      Test 1   **Tuesday, September 21 at 7:45 a.m.**

Wednesday, September 22   Trigonometric Substitution
<u>e-Reserve:</u> Integration
<u>Textbook:</u>
  Study Section 7.4
  p. 512: 5, 9, 13, 17-37 odd, 43, 45, 47, 49

Friday, September 24   Review Integration (SI)

Monday, September 27   Partial Fractions
Wednesday, September 29
<u>e-Reserve:</u> Integration
<u>Textbook:</u>
  Study Section 7.5
  p. 522: 7-27 odd, 41, 43, 45
  QUIZ 3 (Wednesday)

Friday, October 1   Improper Integrals
Monday, October 4
<u>e-Reserve:</u> Improper Integrals
<u>Textbook:</u>
  Study Section 7.8
  p. 547: 9-25 odd
  p. 550: 1-35 odd, 47-57 odd

Wednesday, October 6   Review for Test 2
<u>e-Reserve:</u> Review for Test 2

                    Test 2   **Thursday, October 7 at 7:45 a.m.**

Friday, October 8   Discuss Graphing Portfolios
        Begin preparing your portfolio
                                Polar Coordinates
e-Reserve: Polar Coordinates

                    Mid Semester Break   **October 11-12**

Wednesday, October 13   Polar Coordinates
Friday, October 15
e-Reserve: Polar Coordinates
Calculus Page: Graphing Tutorial, access via e-Reserve
Textbook:
        Study Section 9.4 and Section 9.5 Area part
        p. 690: Study the Special Polar Graphs
        p. 691: 21-35 odd, 67-85 odd
        p. 700: 3-21 odd
        p. 711: 53, 55, 87

Monday, October 18   Review graphing and area in Polar Coordinates

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                    Gateway 1   **Tuesday, October 19 at 8:30 a.m.**

Wednesday, October 20   Infinite Sequences
e-Reserve: Sequences
Textbook:
        Study Section 8.1
        p. 564: 1- 11 odd, 31, 33, 35, 37, 39, 47-63 odd
        QUIZ 4

Friday, October 22   Infinite Series
Monday, October 25
e-Reserve: Infinite Series
Textbook:
        Study Section 8.2
        p. 573: 1-23 odd, 33-39 odd

                    Gateway 2   **Tuesday, October 26 at 8:30 a.m.**

Wednesday, October 27   Integral Test and p-series
Friday, October 29
e-Reserve: Infinite Series

Textbook:
      Study Section 8.3
      p. 580: 1-23 odd, 53-64

Monday, November 1   Comparisons of Series
e-Reserve: Infinite Series
Textbook:
      Study Section 8.4
      p. 587: 3-27 odd, 29-36

Wednesday, November 3   Alternating Series
e-Reserve: Infinite Series
Textbook:
      Study Section 8.5
      p. 595: 9-31 odd, 41-55 odd, 69-77 odd
      QUIZ 5

            Gateway 3   **Thursday, November 4 at 8:30 a.m.**

Friday, November 5   Ratio and Root Test
e-Reserve: Review Infinite Series
Textbook:
      Study Section 8.6
      Study Example 5, p. 601
      see p. 602   Summary of Tests for Series
      p. 603: 1-10 all, 13-31 odd, 35-41 odd, 43-59 odd, 61, 63

Monday, November 8   Review Infinite Series
e-Reserve: Review for Test 3

            Test 3   **Thursday, November 11 at 7:45 a.m.**

Wednesday, November 10   Power Series
e-Reserve: Power Series
Textbook:
      Study Section 8.8
      p. 623: 1-37 odd

Friday, November 12   Power Series
Monday, November 15
Wednesday, November 17
e-Reserve: Power Series, Review Power Series
Textbook:
      Study Section 8.9
      p. 630: 1-16 odd
      QUIZ 6 (Monday)

Friday, November 19   Taylor and Maclaurin Series (8.10)
Monday, November 22
<u>e-Reserve:</u>   Power Series
<u>Textbook:</u>
       Study Section 8.7 and 8.10
       See p. 638 Power Series for Elementary Functions
       p. 641: 1-12 all
       p. 643: 1-6 all, 9-15 odd, 23-29 odd, 37-51 odd, 65-70 all
       QUIZ 7 (Monday)

          Gateway 4   **Tuesday, November 23 at 8:30 a.m.**

           Thanksgiving Break   **November 24 – 26**

Monday, November 29   **Graphing Project due – be ready to present**

Wednesday, December 1   Review for Test 4
<u>e-Reserve:</u>   Review for Test 4

          Test 4   **Thursday, December 2 at 7:45 a.m.**

Friday, December 3   Introduction to Differential Equations: Exact and linear
<u>e-Reserve:</u>   Differential Equations
<u>Textbook:</u>
       Study Sections 5.2 and 5.3
       p. 392: 33-57 odd
       p. 402: 3-11 all

Monday, December 6   Review for Final
<u>e-Reserve:</u>   Review for Final

          Gateway 5 – Last Chance!   **Tuesday, December 7 at 8:30 a.m.**