MATH 150A MATH ANALYSIS I Spring 2005

Lecture MWF 2:00pm - 3:30pm JR 245

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Textbook. D. Varberg, E.J. Purcell, and S.E. Rigdon*Calculus*, 8th Edition, Prentice Hall, Upper Saddle River, New Jersey 07458, 2000.

Course content. Functions; limits and continuity; differentiation: definition, basic rules, chain rule, derivatives for power and trigonometric functions; higher order derivatives; implicit differentiation; related rates problems; linear approximation and differentials; max-min, 2nd derivative test; curve sketching; the mean value theorem; integration: antidifferentiation, area; the definite integral; fundamental theorem of calculus, mean value theorem for integrals; logarithmic and exponential functions; inverse trigonometric functions and their derivatives. 5 credits, 3 classes per week, 3 midterms, 1 final exam.

First two classes. According to the university policy, a student missing first two class meetings "loses the right to remain in the class roll and must formally withdraw from the class". Please, check the policies and regulations in the University Catalog for details and, please, be present.

Deadline to enroll. Subject to availability of seats, permission numbers will be issued to add to this course within first three weeks. During the fourth week, adding a class is permitted in exceptional circumstances only. After week four, starting February 28, students WILL NOT BE PERMITTED TO ADD any classes.

Deadline to drop. During the first three weeks of the semester, students can drop a class through SOLAR. During the fourth week, the student will need the instructors signature. After week four, starting February 28, a partial withdrawal is NORMALLY NOT PERMITTED.

Final. This course has a common final which falls on Friday, May 27, 2005, 2pm–4pm. Rooms will be announced later.

Homework and quiz arrangements. Homework problems are listed for each section in the Lecture Schedule attached to the syllabus. The homework will be randomly collected and some subset from the problems will be graded. Generally, you will NOT be knowing when you will be handing in the assignment so, please, have them ready for each class. The purpose of homework is to strengthen your skills and to give you better understanding of the material through practice. (REMEMBER! Doing homework is crucial for you performance: normally a B requires working out at least 85% of problems.)

Absence from exams. Missing a midterm is permitted only for the most compelling reason. Except in extraordinary situations, permissions should be obtained in advance from the professor to miss an exam; otherwise you will be awarded a 0. If you are excused from taking a midterm, you course grade will be determined by giving extra weight to the final exam. Except in extremely exceptional situations, a student who misses the final exam fails the course.

Incompletes. These are given only in exceptional circumstances. The student must have satisfactorily completed all but a small portion of the work in the course, have a compelling reason for the incomplete, and must have a prior arrangements with the professor for how the incomplete will be removed, well before the end of the term.

Grading policy.

Your course grade is based on (assuming that all grades are made out of 100):

1) Each from three midterms will give you 15% of your Semester Grade;

2) An accumulated grade for completing the homework is 15% of Semester grade;

3) Your performance on the final exam: The grade for the final is 40% of the Semester Grade.

Again, the final exam makes 40%, each midterm makes 15%, and homework makes 15% of the Semester Grade.

Bonus Rule: If the Semester Grade turns out to be less then the grade for the final, then *the grade for the final will be the grade for the course*. In other words, you will always have the highest from two grades.
Note: An S is equivalent to C or better.

Week 1, January 31 — February 4, 2005

M	2.1: Functions, function notation. Domain and range. Graphs. Even and odd functions. 2.2: Operations on functions. Composition of functions.
	HW **2.1**: 4,7,9,13,27,29; **2.2**: 3,13,23; LE **2.1**: 10,14; **2.2**: 4,12.
W	2.4: An introduction to limit. One sided limits. Geometrical interpretation.
	HW **2.4**: 29,30,31,38,39; LE **2.4**: 32,33,37.
F	2.5: The limit of a function: precise definition. ε–δ language. One-sided limits
	HW **2.5**: 1,3,5,7,9,11,12,14,17,18,19; LE **2.5**: 4,6,8,10,13,17.

Week 2, February 7 — February 11, 2005

M	2.6: Limit theorems. The squeeze theorem.
	HW **2.6**: 4,5,7,10,13,15,17,19,21,25,27,33,36(b),39,42; LE **2.6**: 6,14,18,22,28,35,36(a),40.
W	2.7: Limits Involving Trigonometric functions. Special Trigonometric limits.
	HW **2.7**: 1,3,5,7,9,11,13,15,18(a,b); LE **2.7**: 2,4,6,8,10,16.
F	2.8: Limits at infinity. Infinite limits. Relation to asymptotes
	HW **2.8**: 1,5,7,11,15,17,19,23,24,26,31,32,37,39,45,49(a,b,d); LE **2.8**: 2,4,8,10,18,20,25,32,38,49(c,e).

Week 3, February 14 — February 18, 2005

M	Labor Day Holiday; all offices closed
W	2.9: Continuity of functions. Composite limit theorem. Intermediate value theorem.
	HW **2.9**:1,3,5,7,9,11,13,14,16,19,21,23,24,29,33,35,36,39 (??? 41,42); LE **2.9**: 2,6,12,18,20,26,28,34, 38,47.
F	Midterm ♯ 1.

Week 4, February 21 — February 25, 2005

M	3.1: Tangent line. Average and instantaneous velocity.
	HW **3.1**: 9,11,13(a,b),14(a,c); LE **3.1**: 10,12.
W	3.2: The derivative. Differentiability and continuity.
	HW **3.2**: 7,13,19,23,25,27,29,30,33,35,41,48 (?? 49,50); LE **3.2**: 10,14,20,26,28,34,36.
F	3.3 Derivatives of a power function. Rules for finding derivatives.
	HW **3.3**: 7,9,13,15,19,21,37,39,41,43,45,49,51,53 (?? 47,48); LE **3.3**: 10,14,38,44,46,50,50,52.

Week 5, February 28 — March 4, 2005

M	3.4: Derivatives of trigonometric function.
	HW **3.4**: 1,3,5,7,9,11,13,16,19,21,22 (?? 25); LE **3.4**: 2,8,10,12,20,23.
W	3.5: The chain rule.
	HW **3.5**: 1,3,5,7,9,11,13,15,17,19,21,25,27,29,33,35,37,39,48,51; LE **3.5**: 2,6,10,12,14,18,24,34,38,40.
F	3.6 Leibniz notation. Partial proof of chain rule.
	HW **3.6**: 1,5,7,9,11,13,15,17,19,21,23,25 (?? 40); LE **3.6**: 2,6,10,12,14,18,26.

Week 6, March 7 — March 11, 2005

M	3.7: Higher-order derivatives. Mathematical modeling.
	HW **3.7**: 1,3,5,7,9,11,13,15,20,29,36; LE **3.7**: 2,6,12,14,17,19,30.
W	3.8: Implicit differentiation. Power rule.
	HW **3.8**: 1,3,5,7,9,11,13,15,17,19,21,23,27,29,31,33,38,43; LE **3.8**: 2,8,12,14,18,22,26,30,32,34,39,42.
F	3.9: Related rates.
	HW **3.9**: 1,5,7,21,30; LE **3.9**: 2,6,20

Week 7, March 14 — March 18, 2005

M	3.10 Differentials and approximations. Absolute and relative error.
	HW **3.10**: 1,3,5,7,9,10(a),23,27,32,37; LE **3.10**: 2,8,12(a),24,28,36(b)
W	Review Chapter 3.
F	Midterm ♯ 2

Week 8, March 28 — April 1, 2005

M	4.1: Maxima and minima. Critical points.
	HW **4.1**: 1,3,5,7,9,11,13,15,21,23,27; LE **4.1**: 2,8,12,14,22,30.
W	4.2: Monotonicity and concavity. Second derivative and concavity. Inflection points.
	HW **4.2**: 1,5,7,9,11,13,17,24,25,29,31,33,43; LE **4.2**: 2,8,10,12,14,18,26,32,44.
F	4.3: Local maxima and minima. First derivative test. Second derivative test.
	HW **4.3**: 3,5,11,15,17,20,23,25,27 (?? 28,29); LE **4.3**: 4,14,16,19,24.

Week 9, April 4 — April 8, 2005

M	4.4: More max-min problems.
	HW **4.4**: 1,3,5,7,12,32; LE **4.4**: 2,4,6,8,16.
W	4.6: Sophisticated graphing.
	HW **4.6**: 3,9,11,13,17,19,23,25,29,31,32,33,37,41; LE **4.6**: 6,10,12,18,24,26,30,38,40.
F	4.7 The mean value theorem for derivatives.
	HW **4.7**: 1,3,9,15,12,14,17,18,2,22,27,40 (?? 35,41,42); LE **4.7**: 2,4,8,16,19,20,28.

Week 10, April 11 — April 15, 2005

M	5.1: Antiderivative. Antiderivatives of elementary functions. Laws for sum and difference.
	HW **5.1**: 1,3,5,7,9,13,15,17,19,21,23,25,27,29,31,32,33,35,37,39; LE **5.1**: 2,10,16,18,22,26,28,30,34, 36,40.
W	5.2: Introduction to differential equations. Separation of variables
	HW **5.2**: 1,3,5,7,9,11,13,29; LE **5.2**: 2,4,6,8,10,14,28.
F	5.3: Sums and sigma notation.
	HW **5.3**: 1,3,5,7,9,11,13,15,17,19,21,23,25,27,29,31,33,34,37; LE **5.3**:2,4,6,8,10,12,14,16,20,22,26, 32,36.

Week 11, April 18 — April 22, 2005

M	5.4: Introduction to area. Area by inscribed polygons.
	HW **5.4**: 7,11,13,14; LE **5.4**: 8,12.
W	5.5: Riemann sum. The definite integral. Interval additive property.
	HW **5.5**: 2,4,7,9,11,13,15,17,19,21,23(a,c,g),24(a,c,e),25; LE **5.5**: 8,10,12,14,18,20,23(b,h), 24(b,f).
F	5.6: The first fundamental theorem of Calculus. Comparison properties.
	HW **5.6**: 5,7,9,13,17,19,21,23,27,31,39,41,45,47; LE **5.6**: 8,10,12,14,18,20,23(b,h),24(b,f)

Week 12, April 25 — April 29, 2005

M	5.7: The second fundamental theorem of calculus. The mean value theorem for integrals.
	HW **5.7**: 1,3,5,7,9,11,15,17,19,21,23,25,27,29,31,33,35,37,43,45,47,49,52; LE **5.7**: 2,6,8,10,12,16,24, 26,28,32,34,38,46,48,54.
W	5.8: Evaluating definite integrals. Substitution rule. Symmetric and periodic functions.
	HW **5.8**: 1,5,7,9,13,15,17,19,29,31,33,35,37,41,45,49,51,53,55,59(?? 57,58); HW **5.8**: 2,10,12,14,20, 26,32,34,36,42,46,52,54,60.
F	Midterm ♯ 3

Week 13, May 2 — May 6, 2005

M	7.1: The natural logarithm function. Properties of logarithm. Logarithmic differentiation.
	HW **7.1**: 3,5,11,15,17,19,21,23,25,27,29,30,31,33,35,43,46(a); LE **7.1**: 4,6,12,16,18,20,26,28,32,36.
W	7.2: Inverse functions and their derivatives.
	HW **7.2**: 7,9,10,13,15,17,25,27,37,39(?? 41); LE **7.2**: 8,14,18,26,38.
F	7.3: The natural exponential function.
	HW **7.3**: 3,5,7,9,11,13,15,17,19,21,25,27,29,31,33,40; LE **7.3**: 6,10,12,14,20,22,28,30,36.

Week 14, May 9 — May 13, 2005

M	7.4: General exponential and logarithmic functions. Derivative of x^x.
	HW **7.4**: 3,5,7,17,19,23,25,27,29,31; LE **7.4**: 4,8,18,20,24,28,30,32.
W	7.7: The inverse trigonometric functions and their derivatives.
	HW **7.7**: 9,19,21,23,25,27,28,29,31,33,37,39,41,43,45,47,51,55,57,58; LE **7.7**: 10,20,24,26,30,32,34, 36,38,40,48,52,56.
F	Thanksgiving Recess

Week 15, May 16 — May 20, 2005

M	Review
W	Review
F	Review

Final: Friday, May 27, 2005, 2pm–4pm.