MATH 1271 CALCULUS I SPRING 2003

Lecture 030 MWF 11:15am-12:05pm 1701 Univ. Ave. 143

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Textbook. J. Stewart, *Calculus. Early Transcendentals*, 4th Edition, Brooks/Cole Publishing Company, 1999.

Course content. Tangent lines; limits and continuity; differentiation: definition, basic rules, chain rule, rule for trig, exp and log functions; implicit differentiation; rates of change, max-min, related rates problems; 2nd derivative test; curve sketching; linear approximation and differentials; L'Hospital's rule; integration: definition, antidifferentiation, area; simple substitution; volume of solids by cross sections and shells; works; average value of a function. 4 credits. 3 lectures, 2 recitations per week.

Homework and quiz arrangements. Homework problems are listed for each section in the Lecture Schedule attached to the syllabus. Your TA will collect, and grade some subsets of the problems on the list, and will be responsible for all arrangements to do with homework and quizzes which take place in recitation.

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:

1) Your performance on recitation sessions: At the end of the semester your TA will grade your performance on recitations. In the beginning of the semester TA will explain how this grade will be calculated. The Recitation Grade is 15% of the Semester Grade.

2) Your performance on midterms: You will have three midterms each made out of 100 points. Each midterm grade is 15% of the Semester Grade.

3) Your performance on the final exam: The grade for the final is 40% of the Semester Grade (assuming that the final has maximum of 100).

Again, the final exam gives 40%, each midterm gives 15%, and the Recitation Grade gives 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 20 — January 24, 2003

M	Martin Luther King, Jr. Day. No classes	
T-Rc	**2.2**: 3,7,9,15,23,25.	
W	2.4: The precise definition of a limit. Geometrical interpretation. One-side limits. Infinite limits	HW **2.4**,: 6,16,18,20,22,26,28,32, 34,39,40; LE **2.4**: 4,5,15,23,31,35,37
Th-Rc	**2.4**: 3,17,25,36	
F	2.2: The limit of the function. One sided limits. Infinite limits. 2.1: Tangent line, slope of the tangent line. Estimating the slope of the tangent line. Velocity problem. Average Velocity. Instantaneous velocity.	HW **2.2**: 4,6,8,14,16,22,24,26,28; **2.1**: 2,4,7,8; LE **2.2**: 1,2,5,13,18,27; **2.1**: 3,5

Week 2, January 27 — January 31, 2003

M	2.3: Limit laws. Calculating limits using the limit laws. The limit theorems. Squeeze theorem	HW **2.3**: 1,4,5,9,12,16,17,19,24, 25,28,34,36,38,40,42,54; LE **2.3**: 3,8,11,23,35,39
T-Rc	**2.3**: 2,6,7,13,15,27,33,42,45; **2.5**: 5,12,15	
W	2.5: Continuous function. Removable, jump, and infinite discontinuities. Continuity from the right and the left. Properties of the continuous functions. Intermediate value theorem	HW **2.5**: 3,4,6,9,10,13,16,18,20, 22,26,28,32,33,36,40,46,48; LE **2.5**: 11,14,17,23,34,45
Th-Rc	**2.5 cont.**: 19,21,27,31,41,47 **2.6**: 3,7,13,15,20,25,63	
F	2.6: Limits at infinity. Horizontal asymptotes. Infinite limits at infinity	HW **2.6**: 4,6,11,14,16,19,21,24, 26,30,32,44,47,49,61,64; LE **2.6**: 5,12,17,22,27,62

Week 3, February 3 — February 7, 2003

M	2.7: Tangent line. Average and instantaneous velocity. Average and instantaneous rate of change	HW **2.7**: 1,3,7,9,10,12,15,16,19, 24 LE **2.7**: 5,17
T-Rc	**2.7**: 2,6,8,11,18	
W	2.8: Derivative of a function at a point	HW **2.8**: 3,4,6,7,13,16,17,19,20, 22,23,25,34; LE **2.8**: 5,15,24,33
Th-Rc	**2.8**: 2,8,14,18,21,26	
F	2.8 cont.: Interpretation of the derivative as the slope of a tangent, and the rate of change	

Week 4, February 10 — February 14, 2003

M	2.9: Derivative of a function on an interval	HW **2.9**: 2,4,7,8,10,11,14,19,21, 22, 24,3,39,43; LE **2.9**: 6,9,23,27
T-Rc	**2.9**: 5,12,16,20,26,33,42	
W	2.9 cont.: Differentiation operators. Differentiable function. Differentiability and continuity. Review Sections 2.1–2.9	LE **2.9**: 40
Th-Rc	Review Sections 2.1–2.9	
F	February 14. Midterm ♯1	

Week 5, February 17 — February 21, 2003

M	3.1: Derivative of a constant and power functions. The power rule. Constant multiple rule. The sum and difference rules. Derivative of the exponential function. The number **e** and the natural exponent	HW **3.1**: 3,6,7,9,12,13,16,17,19, 20,21,24,25,27,43,47,49,52,61 LE **3.1**: 4,8,10,18,28,45,51
T-Rc	**3.1**: 5,11,14,15,22,23,26,44,48,56	
W	3.2: Product rule. Quotient rule	HW **3.2**: 3,6,8,10,11,13,15,17,18, 19,20,22,23,26,32,36,42; LE **3.2**: 4,5,12,24,43
Th-Rc	**3.2**: 7,9,16,21,25,33,41; **3.3**: 4,13,32	
F	3.3: Rates of change in the natural and social sciences	HW **3.3**: 5,12,15,17,24,29

	Week 6, February 24 — February 28, 2003	
M	3.4: Derivatives of trigonometric functions	HW **3.4**: 1,2,3,6,9,10,12,14,15, 18,22,24,29,35,37,38,39,43; LE **3.4**: 4,8,13,17,21,36,42
T-Rc	**3.4**: 5,7,11,16,19,20,23,40,41,44	
W	3.4 cont.: Derivatives of trigonometric functions. 3.5 Chain rule	HW **3.5**: 1,4,6,8,10,11,12,13,14, 15,16,18,24,27,28,31,35,36,38, 73,75; LE **3.4**: 36,42; **3.5**: 2,3,21
Th-Rc	**3.5**: 5,9,20,22,32,34,40,74	
F	3.5 cont: Chain rule	LE **3.5**: 37,42
	Week 7, March 3 — March 7, 2003	
M	3.6 Implicit differentiation. Derivatives of inverse trigonometric functions	HW **3.6**: 3,6,7,13,14,16,18,20,24, 25,41,45,49,50,53,55; LE **3.6**: 5,15,28,42,59
T-Rc	**3.6**: 4,9,17,19,26,43,47,56; **3.7**: 3,10,18,30	
W	3.7 Higher Derivatives	HW **3.7**: 1,4,5,6,8,9,12,13,19,31, 32,33, 38,59,61; LE **3.7**: 2,7,14,29,35,39
Th-Rc	**3.7 cont.**: 36,40,60; **3.8**: 4,9,10,19,23,26,36,40,46,50	
F	3.8 Derivatives of logarithmic functions. Logarithmic differentiation. The number **e** as a limit	HW **3.8**: 6,7,8,11,13,20,21,22,24, 28,32,35,39,41,44,45,49; LE **3.8**: 2,3,5,14,31,42
	Week 8, March 10 — March 14, 2003	
M	3.10: Related rates	HW **3.10**: 1,3,8,16,17,30 LE **3.10**: 14
T-Rc	**3.10**: 5,9,32; **3.11**: 8,17	
W	3.11: Linear approximation and differentials. Review Chapter 3	HW **3.11**: 6,7,16,18,22,25,27,32, 45; LE **3.11**: 5,15,26,31
Th-Rc	**3.11 cont.**: 24,29,36; Review Chapter 3	
F	March 14. Midterm ♯2	
	Week 9, March 17 — March 21, 2003. Spring Break. Week 10, March 24 — March 28, 2003	
M	4.1: Minimum and maximum values. extreme value theorem. Fermat's theorem. Critical number. Closed interval method.	HW **4.1**: 3,7,12,13,17,23,25,37, 41,45,48,56,59,60,63,76; LE **4.1**: 11,29,36,58
T-Rc	**4.1**: 14,26,30,34,46,47,62,78; **4.2**: 12,15,20	
W	4.2 Rolle's theorem. The mean value theorem. Corollaries.	HW **4.2** 1,3,5,11,13,16,18,24, 26,28,32; LE **4.2**: 2,6,17,25
Th-Rc	**4.2 cont.**: 23,27,33; **4.3**: 5,14,18,22,26,30,40,66	
F	4.3: What does f' say about f. What Does f'' say about f. Inflection point. Second derivative test.	HW **4.3**: 2,6,7,8,13,16,17,19,23, 27,29,41,42,58,63,67 LE **4.3**: 9,15,21,25,64
	Week 11, March 31 — April 4, 2003	
M	4.4: Indeterminate forms and L'Hospital rule. Indeterminate products, differences, and powers	HW **4.4**: 1,2,3,4,6,8,9,12,15, 19,20,22,29,30,40,44,45,48,49,50, 54,55,61,62 LE **4.4**: 5,10,11,18,43,52,63
T-Rc	**4.4**: 7,13,16,25,41,47,53,58,65	
W	4.5. Curve sketching	HW **4.5**: 4,5,10,13,21,22,32,35, 36, 40, 42,45,56,57; LE **4.5**: 11,19,31
Th-Rc	**4.5**: 12,20,33,41,46,53	
F	4.5 cont.: Curve sketching	LE **4.5**: 43,55

Week 12, April 7 — April 11, 2003

M	4.7. Optimization problems. First derivative test.	HW **4.7**: 10,14,16,21,31,38,48; LE **4.7**: 9,17
T-Rc	**4.7**: 11,15,19,34,50	
W	4.10 Antiderivatives. Geometry of antiderivatives. Rectilinear motion	HW **4.10**: 1,4,5,7,9,13,19,23,25, 32,36,40,41,55,60,63 LE **4.10**: 3,14,20,27,62
Th-Rc	**4.10**: 2,10,11,22,29,42,56,64; **5.1** 4,17	
F	5.1 The area problem. The distance problem	HW **5.1** 3,15,19,20,24; LE **5.1**: 4,17

Week 13, April 14 — April 18, 2003

M	5.2 Riemann Sum. The definite integral. Evaluating integrals. Midpoint rule. Properties of the definite integral	HW **5.2**: 5,9,12,16,17,19,21,25, 29,35,38,43,45,48,50,51,57; LE **5.2**: 15,23,33,47,55,
T-Rc	**5.2**: 10,18,22,26,30,36,46,49,56,58; **5.3**: 9,12	
W	5.3 The fundamental theorem of calculus. Differentiation and integration as inverse processes	HW **5.3**: 5,6,813,14,17,18,26,31, 32,36,38,3947,50,52; LE **5.3**: 7,11,21,48
Th-Rc	**5.3 cont.**: 19,29,34,40,49. Review	
F	April 18. Midterm ♯3.	

Week 14, April 21 — April 25, 2003

M	5.4 Indefinite integrals. The total change theorem	HW **5.4**: 1,2,3,4,57,14,19,22,28, 34,37,41,55; LE **5.4**: 2,12,9,21,42
T-Rc	**5.4**: 8,13,26,29,35,38,40	
W	5.5: The substitution rule. Definite integrals. Using Symmetry	HW **5.5**: 2,4,7,9,10,11,19,20,27, 29,32,42,44,49,53,55,59,66,70,82; LE **5.5**: 1,3,13,22,43,52
Th-Rc	**5.5**: 5,6,8,16,24,28,31,41,54,58,65,69; **5.6**: 10	
F	Natural logarithm defined as integral. Natural exponent. General exponential function. The number **e** expressed as limit.	HW **5.6**: 5,6,7,9; LE **5.6** 8

Week 15, April 28 — May 2, 2003

M	6.1 Area between curves	HW **6.1**: 1,3,5,8,9,12,1,21,24,26, 27,29,46,47; LE **6.1**: 2,15,19,20,44
T-Rc	**6.1**: 4,10,11,22,28,30,45; **6.2**: 3,10,12	
W	6.2 Volumes	HW **6.2** 1,4,5,6,17,32,33,48, 50,62; LE **6.2**: 2,8,16,35,47
Th-Rc	**6.2 cont.**: 36,46,59; **6.3**: 5,10,20,24,32,38	
F	6.3: Volumes by cylindrical shells	HW **6.3**: 3,7,11,13,18,21,25, 29,39; LE **6.3**: 4,9,22,37

Week 16, May 5 — May 9, 2003

M	6.4: Work	HW **6.4**: 2,6,11,16,26 LE **6.4**: 3,12,15
T-Rc	**6.4**: 5,13,25; **6.5**: 3,7,10	
W	6.5: Average value of the function. Mean value theorem for integrals	HW **6.5**: 1,4,5,9,14,16; LE **6.5**: 2,6,13
Th-Rc	Review	
F	Review	

May 12, 2003. FINAL 1:30pm–4:30pm