

Syllabus for SM121A

Calculus I

Spring Semester 2005

TEXT: *CALCULUS, Concepts and Contexts, Second Edition*, by James Stewart

NOTES:

1. A website at <http://usna.edu/MathDept/website/local/courses.htm> will have the most current information about the course, including this syllabus, practice exams, web links, etc.
2. All students are expected to have a calculator like the VOYAGE 200 with the capability to do symbolic calculations. Some homework assignments and questions on the common final exam require using calculator.
3. If you would like help in the course, you should contact your instructor for extra-instruction. If your instructor is not available, try the **Math Lab**. It is staffed all six class periods with instructors who should be able to answer your questions. Also, peer tutoring available in the evenings, provided by upper classmen.
4. Exercises that ask for verbal explanations should be answered with complete sentences.
5. In the syllabus below, the LABS in the PROBLEMS column are considered part of the course

LESSON	SECTION	TOPIC	PROBLEMS
1	Appendix B	Coordinate Geometry	p. A16: 1,9,10,17,21,26 (interval notation p.A2)
2	Appendix B	(continued)	p. A16: 38,39,50,52,54
3	Appendix C	(thru equ. 8 & graphs)	p. A27: 1,3,5,8,12,13,17,29,30
4	1.1	Representing Functions	p. 22: 2,6,8,16,30,35,41,49
5	1.2	Mathematical Models	p. 35: 3,7,9,11,13,14
6		Practice & Review	
7	1.3	New Functions from Old	p. 46: 1,3,5,10,11,17,21
8	1.3	(continued)	p. 46: 15,28,32,35,36,49 (WAVE LAB)
9	1.5	Exponential Functions	p.63: 1,4,11,13,15,20,23 (PARACHUTE LAB)
10	1.6	Inverse Functions and Logs	p. 73: 4,5,6,13,15,16,17,20,23,35
11		Practice & Review	
12	Appendix C	Inverse Trig Func.	p. A28: 41,42,43,47,48
13	1.7	Parametric Curves	p. 81: 1,2,5,6,9,13,16,25
14	1.1-1.7	Review	p. 24: 48; p.37: 16; p.48: 53; p. 64: 26; p.74: 58
15		Test 1	
16		Test 1 debrief	
17	2.1	Tangent and Velocity	p. 99: 1,3,5,8 (TOWER LAB)
18	2.2	Limit of a Function	p. 108: 1,2,5,6,9,13,17
19		Practice & Review	
20	2.3	Limit Laws	p. 117: 1,2,9,15,19,23,33
21	2.4	Continuity	p. 128: 1,2,4,7,9,16,26,30,33
22	2.5	Limits Involving Infinity	p. 139: 1,2,4,6,16,21,22,35
23	2.6	Tangents, etc.	p. 148: 1,2,3,4,5,13,14,20,22
24		Practice & Review	
25	2.7	Derivatives	p. 155: 1,2,3,4,9,28
26	2.8	Derivative as a Function	p. 167: 1,3,4,8,9,19
27	2.8	(continued)	p. 167: 20,31,35,48
28		Practice & Review	
29	2.9	Linear Approximations	p. 173: 5,8, 9,13
30	2.10	What does f' say about f ?	p. 178: 1,2,4,5,8,10,12,19,28
31		Review	p. 182: 1,2,5,10,21,27,28,33,36,37,43,46
32		Test 2	
33		Test 2 debrief	
34	3.1	Differentiation Rules	p. 196: 4,5,13,18,24,31,45
35	3.1	(continued) Product and Quotient	p. 196: 2,3,7,9,15,19,37,56
36	3.2	Rules	p. 204: 1,2,3,8,22,28,29,31,34
37		Practice & Review	
38	3.3	Rates of Change	p. 215: 1,5,11
39		(continued)	p. 215: 13,14,27

40	3.4	Derivatives of Trig	p. 223: 1,3,4,7,14,28,31,37
41		Practice & Review	
42	3.5	Chain Rule	p. 233: 3,6,16,38,41,42
43	3.5	(continued)	p. 233: 45,55,62,65,73
44	3.6	Implicit Differentiation	p. 243: 1,2,5,18,25,37 skip orthogonal fns.
45	3.7	Derivatives of Logs	p. 250: 1,2,5,18,25,37 skip logarithmic differentiation
46	3.8	Linear Approximations...	p. 256: 1,10,15,19,20
47	3.5-3.8	Review	p.233: 7,26,57; p. 243: 18; p.250: 17,31,36; p.256: 2,8
48		Test 3	
49		Test 3 debrief	
50	4.1	Related Rates	p. 269: 1,2,5,7 (RATES LAB)
51	4.1	(continued)	p. 269: 14,25,30
52		Practice & Review	
53	4.2	Max and Min Values	p. 276: 1,2,3,6,7,9
54		(continued)	p. 276: 13,35,39,52
55	4.3	Derivatives and Shapes	p. 288: 1,2,3,4,5,7,9, 12,17,24,25,26
56		Practice & Review	
57	4.5	Indeterminate Forms	p. 305: 7,10,11,14,15,22
58	4.5	(continued)	p. 305: 27,30,31,33,41
59	4.6	Optimization Problems	p. 312: 3,5,6,7,8,10
60	4.6	(continued)	p. 312: 19,23,40
61	4.6	(continued)	p. 312: 12,21,27
62	4.8	Newton's Method	p. 327: 1,3,4,6,9,22
63		Practice & Review	
64	4.9	Antiderivatives	p. 334: 2,7,10,11,27,30,33,37,44 (DECK LAB)
65	5.1	Area	p. 355: 2,3,4,11
66	5.2	The Definite Integral	p. 367: 1,5,6,8,12,17,30
67		Review	p. 305: 10,25,47; p. 327: 16,30; p.334: 6,36; p.355: 12,13,18; p.367: 32,36,41; p. 377:30,37,57,60
68		Test 4	
69		Test 4 debrief	
70		Review for Final Exam	
71		Review for Final Exam	
72		Review for Final Exam	
73		Review for Final Exam	

CALCULATOR NOTES:

The latest version of the VOYAGE 200 guidebook is at <http://education.ti.com/educationportal/>

Appendix C: Note, for example, that tExpand(sin(x+y)) gives the sum formula. One way to change from degrees to radians is to enter 2nd D (for degrees) in radian mode. One way to reverse is to use 2nd Y D D (decimal degrees).

- 1.1 Be sure you can define your own functions on the calculator, either by define or store. (Piecewise functions are hard to enter - beyond the course expectations.)
- 1.4 Using Y=, GRAPH, TABLE gives a function algebraically, visually, and numerically. If a graph is taking too long to draw, the ON key interrupts. Zoomdec (F2 4) gives correct aspect ratio - makes circles circular.
To get roughly Figure 6, change the xmin/xmax window to plus or minus a)15, b)12.5, c)11.25, d)7.5.
To get Figure 11, try $x^{(1/3)}$ - note decimal point
- 1.4 Use the calculator to compose functions. Sometimes $g(f(x))$ will give an error. It can be avoided by defining f and g using a variable other than x (say t) but then using x for the composition. Try drawing shifted and stretched graphs with the calculator. In the Y= screen, F4 unchecks/checks a function to not draw/draw it and F3 may be needed to edit (change) a function or clear and re-enter it.
- 1.7 The MODE key allows one to change Graph-parametric. Under Y= menu, F1 toolkit, 9 Format, Graph order 2 simultaneous, allows checking for simultaneous collision. Lead cursor ON to see $\cos(3t) \sin(3t)$ 3 times.

- 2.1 All the many points in a problem like number 9 can be done quickly by defining a secant slope function on the calculator. For example, define $f(x)$ then use $((f(x)-f(1))/(x-1))|_{x=\{2,1.5,1.4,1.3,1.2,1.1\}}$. Old assigned variables can cause errors - recommend using single letter variable names and then erasing with F6.
- 2.2 The VOYAGE 200 takes limits! For example define $g(x)=x/x$. Then $g(0)$ is undefined. But $\lim_{x \rightarrow 0} g(x)=1$. And it does one sided limits, e.g. $\lim_{x \rightarrow 0^-} \text{abs}(x)/x = -1$ (where -7 can be any negative) for limit from the negative side.
- 2.4 Graph the floor and ceiling functions and understand in what way the calculator graphs are wrong.
- 2.5 Graph functions with infinite limits and understand how the calculator graphs can be wrong (drawing vertical asymptotes). The VOYAGE 200 can use ∞ (2nd J) in both ways.
- 2.6 The VOYAGE 200 will draw tangent lines and give the equation (graph and then use F5 math A).