

## Syllabus for SM121A

## Calculus I

Spring Semester 2007

TEXT: *CALCULUS, Early Transcendentals*, Edition 5e by James Stewart

LESSON	SECTION	TOPIC	PROBLEMS
1 (review)	App B	Coordinate Geometry & Lines	p. A15: 1,7,14,19,25,28,29,36,41,59
2 (review)	App C	Second-Degree Equations	p. A23: 3,7,11,13,15,16,17,19,21,29,33
3 (review)	App D	Trigonometry	<a href="#">p. A32: 4.9,13,19,23,26,35,65,81 WAVE LAB</a>
4	1.1	Representing functions	p. 22: 1,7,8,15,17,21,23,25,33,45,53,63
5	1.2	Math models: essential functions	p. 35: 1,3,5,9,13,15,16
6		Practice & Review	
7	1.3	New functions from old	p. 45: 1,3,4,10,15,23
8	1.3	(continued)	p. 45: 32,40,42,49,54
9	1.4	Graphing calculators	p. 53: 3,4,14,19,21,29
10	1.5	Exponential functions	<a href="#">p. 62: 3,6,12,13,16,17,22,25,26 PARACHUTE LAB</a>
11	1.6	Inverse functions, logs	p. 74: 1,4,7,8,9,21,23,36,39,59,63
12		Review	
13		Test 1	
14		Test Debrief	
15	2.1	Tangents	<a href="#">p. 91: 1,3,5,6,7,8, TOWER LAB</a>
16	2.2	Limit of a function	p. 102: 1,3,4,7,8,12,15,23,24,26,32
17	2.3	Limit laws	p. 111: 2,11,12,13,15,17,18
18	2.3	(continued)	p. 111: 22,33,39,45,46,48
19		Practice & Review	
20	2.5	Continuity	p. 133: 3,4,6,19,20,36,39,41,47,49,53
21	2.6	Limits involving infinity	p. 146: 1,3,4,10,13,17,18,19,20,37,38,39
22	2.7	Velocity	p. 155: 1,3,5,7,15,20,25
23		Practice & Review	
24	2.8	Derivative	p. 163: 1,3,4,9,13
25	2.8	(continued)	p. 163: 19,25,28,32,33
26	2.9	Derivative as a function	p. 173: 1,4,10,11,16,21,22,23,38
27		Review	
28		Test 2	
29		Test Debrief	
30	3.1	Derivatives of polynomials	p. 191: 3,5,8,9,12,13,14,23,25,30,42,45,51,56
31	3.2	Product and quotient rules	p. 197: 1,2,3,5,6,9,17,19,25,28,31
32		Practice & Review	
33	3.3	Rate of change	p. 208: 3,10,12,14,15,17,21,29,33
34	3.4	Trig derivatives	p. 216: 1,2,3,8,9,17,18
35	3.4	(continued)	p. 216: 21,22,25,29,33
36	3.5	Chain rule	p. 224: 1,3,6,7,9,11,15,16,33,38,43
37	3.5	(continued)	p. 224: 53,55,59,65,68
38	3.6	Implicit differentiation	p. 233: 1,2,5,9,10,11,25

39	3.6	(continued)	p. 233: 41,43,49,50,65
40	3.7	Higher derivatives	<a href="#">p. 240: 3,4,5,7,35,41,43,47,RADAR LAB</a>
41	3.8	Derivatives of logs	p. 249: 2,3,5,8,21,24
42	3.8	(continued)	p. 249: 26,31,35,39,41
43	3.10	Related rates	<a href="#">p.260: 2,7,11,14,16, RATES LAB</a>
44	3.10	(continued)	p.260: 17,20,27,31,34
45		Practice & Review	
46	3.11	Linear approximations	p. 267: 4,5,9,14,15,31,41,42
47		Review	
48		Test 3	
49		Test Debrief	
50	4.1	Max and min values	p. 285: 1,2,3,6,7,21,22,25,32
51	4.1	(continued)	p. 285: 38,45,47,48,53,56
52	4.2	Mean Value Theorem	p. 295: 1,4,5,7,11,12,13,17,34
53	4.3	Derivatives and shapes	p. 304: 2,3,5,7,8,11,18
54	4.3	(continued)	p.304: 21,24,25,31,33,39,46
55		Practice & Review	
56	4.4	Indeterminate forms	p. 313: 1,2,5,7,11,15
57	4.4	(continued)	p. 313: 20,29,37,44,57
58	4.5	Summary of curve sketching	p.323: 3,5,9,12,16
59	4.5	(continued)	p.323: 20,29,31,47
60	4.6	Graphing with calculators	p.330: 1,5,8,9,15
61	4.7	Optimization problems	p. 336: 3,5,6,7,8,10,12,15
62	4.7	(continued)	p. 336: 28,29,31
63		Practice & Review	
64	4.9	Newton's Method	p. 351: 3,5,6,13,15
65	4.10	Antiderivatives	p. 358: 1,7,13,19,22,23,30,43,45,48,60,61,74
66	5.1	Area	p. 378: 2,3,4,11
67	5.2	Definite Integral	p. 390: 7,9,17,29,33,34,35,36
68		Review	
69		Test 4	
70		Test Debrief	
71-74		Review for final exam	

#### NOTES:

1. A website at <http://www.usna.edu/MathDept/website/local/courses> 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 is available in the evenings, provided by upper classmen.
4. Exercises that ask for verbal explanations should be answered with complete sentences.

## CALCULATOR NOTES:

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

Appendix C: Note, for example, that  $\text{tExpand}(\sin(x+y))$  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  $\lim_{x \rightarrow 0} (g(x),x,0)=1$ . And it does one sided limits, e.g.  $\lim_{x \rightarrow 0^-} (\text{abs}(x)/x,x,0,-7) = -1$  (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  $\infty$  (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).

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