

SM223 Calculus III with Optimization
Fall Semester, 2012-3
Stewart, *Calculus, Early Transcendentals*, 7th Edition

1. Objectives:
 - A. Use vectors to explain the algebra and geometry of multidimensional space.
 - B. Use vector-valued functions to describe curves, surfaces, and motion in space.
 - C. Apply functions of several variables, their derivatives, and their integrals to a variety of geometric and physical problems, particularly optimization problems.

2. Please visit <http://www.usna.edu/MathDept/website/local/courses.htm> for current information about this course and others, including this syllabus, old final exams, etc.

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** in CH130. It is staffed all six periods every class day with instructors who should be able to answer your questions. Also, the **Midshipman Group Study Program** (MGSP) will be available evenings from Sunday through Thursday. Upper class midshipmen will be available to help as you work on Calculus III in groups. More information will be available early in the semester; also see <http://intranet.usna.edu/AcCenter/MGSP.htm>

4. Calculus III is very geometric in nature. Almost every concept we will study has a corresponding visualization. Mathematica, DPGraph, and other software programs are available for graphing in three dimensions. All students in this course are expected to have a calculator like the TI-*n*spire which can graph and do symbolic calculations. This calculator will also graph in three dimensions. There will be assignments and questions on the final exam for which such a calculator will be essential. At the same time, performing simpler computations by hand is extremely important. There will be questions on the final exam for which using calculators is not allowed. There will also be at least one question on the final exam for which the key word is "explain." More details on the final exam will be available later in the semester.

5. Your instructor may modify the schedule and list of problems below. The starred problems are not available in WebAssign.

Course coordinator: C. C. Hanna; cch@usna.edu

#	Section	Topics	Homework
1.	12.1	Review 3-D	p790 4, 8, 10, 11, 16, 39*
2.	12.2	Review Vectors	p799 20, 25, 26, 32, 36, 38, 39*
3.	12.3	Review Dot Products	p806 8, 10, 12*, 18, 22, 26*, 27
4.	12.3	Review Dot Products	p807 39*, 41, 49, 50, 55, 56*
5.	12.4	Review Cross Products	p814 5, 10, 16, 19, 30*, 39
6.	12.5	Review Lines & Planes	p824 1, 3, 4, 7, 10, 12*, 17
7.	12.5	Review Lines & Planes	p824 23*, 26*, 29*, 30*, 31, 35
8.	12.5	Review Lines & Planes	p824 16, 45, 48, 57, 61, 67*
9.	12.6	Surfaces	p833 4, 11, 14, 21-28
10.	13.1	Review Space Curves	p846 7, 8*, 10*, 17*, 21-26, 47, 48
11.	13.2	Derivatives & Integrals	p852 1*, 9, 19, 31, 41
	13.3	Arc Length	p860 1, 5, 7*, 15*
12.		Review	
13.		EXAM ONE	

#	Section	Topics	Homework
14.	13.4	Motion in Space	p870 1, 2*, 9*, 10, 13, 14*
15.	13.4	Motion in Space	p870 15, 16, 17a, 18a, 21
16.	13.4	Motion in Space	p870 19, 23, 24, 25
17.	13.4	Motion in Space	p870 26, 27, 28*, 30*
18.	14.1	Multivariable Functions	p888 2, 7, 8*, 32
19.	14.1	Level Curves	p889 34*, 36, 46*, 47, 59-64
20.	14.3	Partial Derivatives	p911 3, 4*, 10, 15, 19, 20, 22*
21.	14.3	Partial Derivatives	p913 42, 43, 57, 73, 74*
22.	14.4	Tangent Planes	p922 1*, 2, 3, 4*, 19*, 20*
23.	14.4	Tangent Planes	p923 22, 33, 34, 35, 39, 40
24.	14.5	Chain Rule	p930 1, 2, 10, 13, 37, 38, 39
25.		Review	
26.		EXAM TWO	
27.	14.6	Directional Derivatives	p943 1*, 7, 8, 9*, 12*, 13, 15
28.	14.6	Gradients	p943 18*, 19, 25, 26*, 28*, 29
29.	14.6	Gradients	p944 31, 32, 33, 37*, 38*, 41, 43*
30.	14.6	Gradients	p945 47*, 48*, 49, 51*, 54, 56*
31.	14.7	Optimization	p953 1*, 3, 5*, 6*, 7*, 8*, 9*
32.	14.7	Optimization	p954 10*, 11, 12, 13, 16, 17, 18
33.	14.7	Optimization	p954 31, 35, 39, 40*, 41, 42
34.	14.7	Optimization	p955 43, 45, 47, 48, 50, 51
35.	14.8	Lagrange Multipliers	p963 3, 4, 5, 6, 7, 8*, 9
36.	14.8	Lagrange Multipliers	p963 10, 13, 19, 20, 29, 30*
37.	14.8	Lagrange Multipliers	p963 15, 16, 31, 32, 33, 35, 37
38.		Review	
39.		Review	
40.		EXAM THREE	
41.	15.1	Double Integrals	p981 1, 5*, 6, 8, 9, 11, 12
42.	15.2	Iterated Integrals	p987 16*, 17, 25, 26*, 27, 30
43.	15.3	Double Integrals over	p995 7, 8, 14*, 19, 20, 23
44.	15.3	General Regions	p995 26, 30, 41*, 43, 46*, 49, 62*
45.	10.3	Polar Coordinates	p663 10*, 12, 16*, 17*, 21*, 22*, 29*, 46*
46.	15.4	Polar Double Integrals	p1002 7*, 8*, 10*, 15, 18, 21, 22, 30, 31
47.	15.5	Applications	p1012 1*, 3*, 5, 8*, 10, 13, 15*
48.	15.7	Triple Integrals	p1025 9, 13, 14, 15, 16, 17
49.	15.7	Triple Integrals	p1025 19, 20*, 21*, 22*, 23*
50.	15.7	Triple Integrals	p1026 32*, 33, 35, 36*
51.	15.7	Triple Integrals	p1026 39, 41, 42, 49a*, 49b*
52.	15.8	Cylindrical Coordinates	p1031 5, 6, 9, 12, 17, 18*, 19, 20
53.	15.8	Cylindrical Coordinates	p1031 21, 22, 23, 25, 29, 30
54.		Review	
55.		EXAM FOUR	
56.-60.		Review for Final Exam	