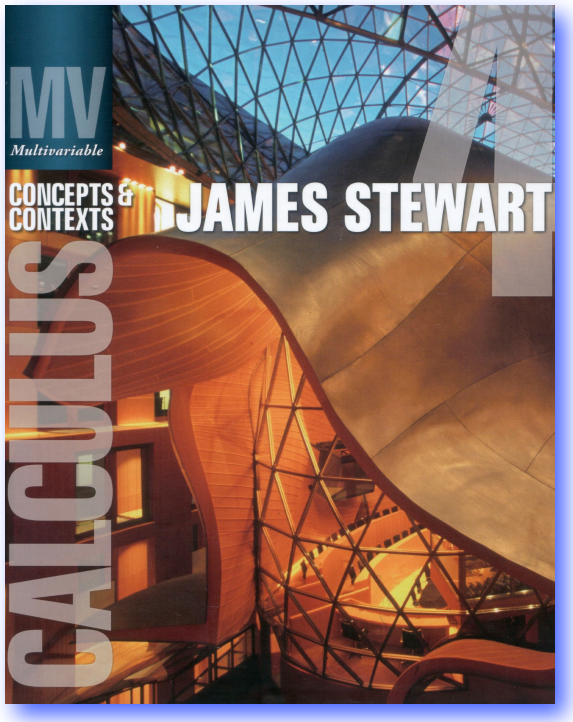
Textbook



James Stewart, Multivariable Calculus, 5th edition 2009, ISBN-10:0-495-56054-5

Organisation

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Computer Algebra

We will have a computer algebra project in this course. Harvard has a cite licence for Mathematica a professional and powerful software.

Sections

The course lectures (except reviews and intro meetings) are taught in sections. This assures you can discuss the material in class. Additional problem sessions as in math21a. Sections:

MWF 10,MWF 11,MWF 12,TTH 10-11:30, TTh 11:30-13:00.

MQC

Our Math question Center is open Sunday to Thursday

Important Dates

1.Exam	2.Exam	Final
Oct 6	Nov 3	TBA
7 PM	7 PM	TBA
Hall C	Hall C	TBA

Grades

Part	Percentage
1. Hourly	15
2. Hourly	15
Homework	25
Lab	5
Final	40

Harvard University Fall 2009

Math 21a

Syllabus 2009

This standard multivariable calculus course extends single variable calculus to higher dimensions. It provides a vocabulary for understanding fundamental equations of nature like weather, planetary motion, waves, heat, finance, or quantum mechanics. It teaches important background needed for statistics, computer graphics, bioinformatics, etc. It provides tools for describing curves, surfaces, solids and other geometrical objects in three dimensions. It develops methods for solving optimization problems with and without constraints. You learn a powerful computer algebra system. The course will enhance problem solving skills and prepares you for further study in other fields of mathematics and its applications.

Calendar

Su	Mo	Tu	We	Th	Fr	Sa
30	31	1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26

Syllabus

1. Geometry of Space 9/8-9/12

1	coordinates	9.1
	distance	
2	vectors	9.2
	dot product	9.3

2. Functions and Graphs 9/14-9/19

1	cross product and planes	9.4
2	lines and planes	9.5
	distance formulas	
3	functions, graphs	9.6
	level curves, and surfaces	
	quadrics	

3. Curves 9/21-9/26

1	curves in space, velocity	10.1
	acceleration	10.2
2	arc length	10.3
	curvature	10.4
3	cylindrical coordinates	9.7
	spherical coordinates	

4. Surfaces 9/28-10/3

1	parametric surfaces	10.5
2	functions	11.1
3	continuity	11.2

5. Functions 10/5-10/10

1	review for first hourly	
	first Midterm (week 1-4)	Oct 6
2	partial derivatives	11.3
	solutions to PDE's	
3	linear approximation	11.4

6. Gradient 10/12-10/17

	Columbus day (no class)	Oct 12
1	chain rule	11.5
	implicit differentiation	
2	gradient, tangent spaces	11.6
	directional derivative	11.6

7. Extrema 10/19-10/24

1	maxima, minima, saddle points	11.7
2	Lagrange multipliers	11.8
3	Global extremal problems	11.8

8. Double Integrals 10/26-10/31

1	Double integrals	12.12
2	Double integrals	12.3
3	polar coordinates	12.4

9. Surface area 11/2-11/7

1	Review for second midterm	
	second Midterm (week 5-8)	Nov 3
2	applications of double integrals	12.5
	surface area	12.6
3	triple integrals	12.7

10. Triple and line Integrals 11/9-11/14

2	cylinder, spherical coordinates	12.8
3	vector fields	13.1
	line integrals	13.2

11. Integral Theorems I 11/16-11/21

1	fundamental thm line integrals	13.3
2	Greens theorem	13.4
3	curl and divergence	13.5

12. Integral Theorems II 11/23-11/28

1	flux integrals	13.6
2	Stokes theorem	13.7
	Thanksgiving break	

13. Review 11/30-12/3

1	Stokes theorem review	
2	Gauss theorem	13.8
3	Review	