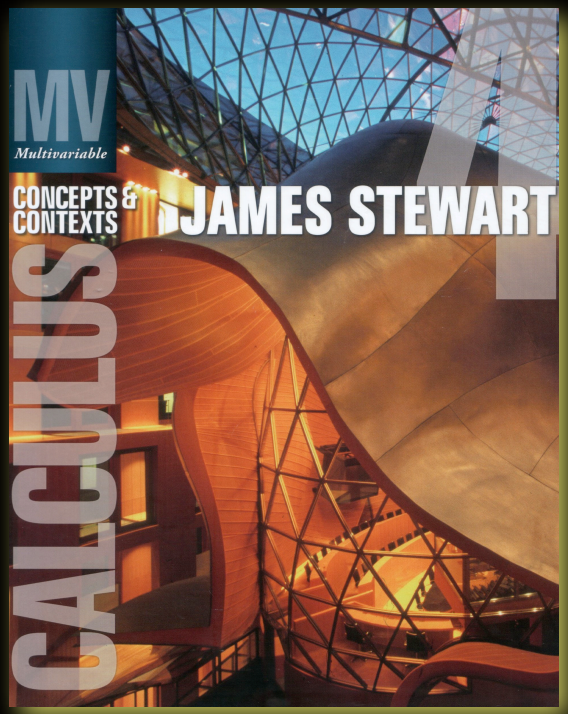
Textbook



James Stewart, Multivariable Calculus, 4th edition 2009, ISBN-10:0-495-56054-5

Organisation

Course head: Oliver Knill

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Mathematica

We will have a computer algebra project in this course. Harvard has a cite license 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 help too. See other handout. Sections:

MWF 9,MWF 10,MWF 11,MWF 12,TTH 10-11:30, TTh 11:30-13:00.

MQC

Sun to Thu in 309a, 8:30-10:30PM

Dates

1.Exam	2.Exam	Final
Oct 4	Nov 1	TBA
7 PM	5:30 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 2011

Math 21a

Syllabus 2011

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, economics or physics. 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
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	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

Syllabus

1. Vector geometry 9/6-9/9

1	Labor day (no class)	Sep 5
2	coordinates and distance	9.1
3	vectors	9.2
	dot product	9.3

2. Functions 9/12-9/16

1	cross product and planes	9.4
2	lines and planes, distances	9.5
3	functions, graphs ,quadric	9.6

3. Curves 9/19-9/23

1	curves, velocity, acceleration	10.1-2
2	arc length curvature	10.3-4
3	other coordinates	9.7

4. Surfaces 9/6-9.30

1	parametric surfaces	10.5
2	continuity	11.1-11.2
3	partial derivatives, gradient	11.3

5. Partial derivatives 10/3-10/7

1	review for first hourly	
	first midterm (week 1-4)	Oct 4
2	partial differential equations	11.3
3	linear approximation	11.4

6. Gradient 10/10-10/14

1	Columbus day (no class)	Oct 10
2	chain rule implicit differentiation	11.5
3	tangent spaces directional deriv	11.6

7. Extrema 10/17-10/21

1	maxima, minima, saddle points	11.7
2	Lagrange multipliers	11.8
3	more problems, global extrema	11.8

8. Double integrals 10/24-10/28

1	double integrals	12.1-3
2	polar integration	12.4
3	surface area	12.6

9. Triple integrals 10/31-11/4

1	review for second midterm	
	second midterm (week 5-8)	Nov 1
2	triple integrals	12.7
3	spherical integrals	12.8

10. Line integral theorem 11/7-11/11

1	vector fields	13.1
2	line integral theorem	13.2
3	veterans day (no class)	Nov 11

11. Greens theorem 11/1411/18

1	Greens theorem	13.4
2	curl and divergence	13.5
3	flux integrals	13.6

12. Stokes theorem 11/21-11/25

1	Stokes theorem	13.7
2	thanksgiving break	Nov 23-26
3	thanksgiving break	

13. Divergence theorem 11/1812/2

1	Stokes theorem review	
2	divergence theorem	13.8
3	Overview	