Fall-2015. Math 53. Multivariable Calculus (ccn: 53888)

Lectures: by Alexander Givental, MWF 3-4, in 155 Dwinelle
Office hours: W 4:30-6 and Th 2-3:30 in 701 Evans
Grading: Final exam (40%) + Midterm I (10%) + Midterm II (20%) + Quizzes during discussion sections (20%) + hw (10%)
Textbook: James Stewart, *Multivariable Calculus. Early Transcendentals for UC Berkeley. Seventh Edition.*
ISBN-13: 978-1-285-13239-6
This is a reprint of chapters 10, 12-16 from the 7th edition of Stewart's "Calculus. Early Transcendentals",
tailored for UC Berkeley multivariable calculus courses.
Homework: Exercises to solve are posted here by weeks.
Written solutions are due on Th of the next week at the discussion section.
Enrollment issues: Visit *Thomas Brown* in 965 Evans
Midterm I: Friday, September 25 (Chapter 12 + Sections 10.5, 13.1-13.3)
Midterm II: Friday, November 6 (Chapter 14)
Final Exam: Tuesday, December 15, 2015, 7-10 pm (Covers the entire course, with emphasis on Ch. 15-16)
All exams are "closed books, closed notes, no calculators"

Office hours

Alexander Givental: W 4:30-6, Th 2-3:30 in 701 Evans
Matthew Harrison-Trainor: Tu 9:30-11:30, F 10:30-11:30 in 743 Evans
Noble Macfarlane: MW 9-10 in 845 Evans
James McIvor: W 12-3 in 1095 Evans
Nate Ngerebara: F 9-11 in 868 Evans
Thunwa "Nics" Theerakarn: MoTu 4:30-5:30 in 745 Evans
Andy Voellmer: TuTh 11:10-12:10 in ???

Here are practice and sample problems from past versions of Midterm I.
Of course, for the actual exam, I will have to come up with new ideas - except that I am not sure where to get them ...
Regardless of all this, the exam is this Friday, Sep. 25. Time and location are the same as for the lectures. (I realize that for some this might look like a riddle.) All exams are "closed books / closed notes / no calculators". You'll be provided with a copy of the exam with space for writing in your solutions.

Syllabus

Week 1 (Aug. 26,28) Introduction. Vectors. Dot-product.
Read: 12.1-12.3
Solve (due 09.03): 12.2(3,8,29,38,39,44,46,51), 12.3(1,12,26,29, 50,62, 63,64)

Week 2: Cross-product. Applications
Read: 12.4-12.5
Solve (due 09.10): 12.4(2,7,20,31,33,38) 12.5(5,7,12,19,27,34.43,51)

Week 3 (Sep. 9,11) Quadratic functions and curves.
Read: 12.6, 10.5
Solve (due 09.17): 10.5(16,25,26,27,34)

Week 4: Quadratic surfaces. Vector-valued functions.
Read: 12.6, 13.1, 13.2, 13.3 (arc length)
Solve (due 09.24): 12.6(6,8,21-28), 13.1(21-26,48) 13.2(23,45) 13.3(3,11,13)

It turned out that Irina Boyadzhiev from Ohio State U made a cool applet illustrating the properties of conic sections we discussed at the end of the topic "vector-valued functions". (Unrelated to that: Can you figure out the color of this font?)

Week 5: Scalar-valued functions of several variables.
Midterm I (Ch. 12, Sect. 13.1-13.3, Sect. 10.5), Friday, Sep. 25
Read: 14.1, 14,2, 14.4
Solve (due 10.01): 14.1(51,52,59-64) 14.2(10,16,36) 14.4(17,35,45,46)

Week 6: Taylor's formula. The chain rule. Implicit differentiation.
Read: 14.3, 14.4, 14.5
Solve (due 10.8): 14.3(67,69,80,95,101abcde) 14.5(7,13,24,28,34,53,55,58)

One of our GSIs maintains a website with plenty of useful information for this course, including many additional exercises.

Week 7: Gradient. Maximum and minimum values
Read: 14.6-14.7
Solve (due 10.15): 14.6(20,21,29,41,45,56), 14.7(9,12,15,29,30,50,55)

Week 8: Constrained extrema (Lagrange multipliers)
Read: 14.8
Solve (due 10.22): 14.8(7,11,19,25,26,38,41,45)

Here are practice problems for Midterm II.

Week 9: Multiple integrals
Read: 15.1-15.3,15.7,15.10
Solve (due 10.29): 15.2(7,17,27) 15.3(9,15,29,32,,43,52) 15.7(33-36) 15.10(5,9,24)

Week 10: Change of variables. Applications
Read: 15.4, 15.5, 15.7-15.9
Solve (due 11.05): 15.4(7,11,22,41) 15.5(13,14,15,19) 15.8(15,16,29,30) 15.9(17,18,39,40)

Week 11: Vector fields. Line integrals. / Midterm II (Ch. 14), Friday, Nov. 6 (Solutions)
Read: 16.1-16.3
Solve (due 11.12): 16.1(6,11-14,26,29-32) 16.2(3,14,22,27,37,39) 16.3(6,16,23,29,31-34)

Week 12 (Nov. 9,13): Green's Theorem.
Read: 16.4, 16.5
Solve (due 11.19): 16.4(2,4,12,21,22,24,27) 16.5(4,5,9-11,15,27,29,30,32,37)

Week 13: Curl and divergence. Surface integrals
Read: 16.6, 16.7
Solve (due Tu, 11.24): 16.6(3-6,13-18,35,48) 16.7(8,20)

Week 14 (Nov. 23): Orientation and flux.
Read: 16.7
Solve (due Th 12.03): 16.7(23,37,39,46)

Practice problems for the Final Exam
Here are solutions for some of them.

Week 15: Stokes and Gauss.
Read: 16.8, 16.9
Solve (due 12.10): 16.8(2,6,13,15,18,19) 16.9(4,6,13,23,26,28,31)

The RRR-week (Dec. 7-11): All Mysteries RRRevealed!

FINAL EXAM is on Tue, Dec. 15, 7-10 pm in 105 Stanley Hall. Good luck!
... and here are the solutions!
