Calculus 1A: Student Handout. Revised 1/21/03

Spring 2003, TT 8:00am - 9:30pm, Room 155 Dwinelle Hall

Instructor: Prof. Zvezdelina Stankova (Please, drop the “professorship”, and call me “Zvezda”.)

Office: Evans 719
Tel: (510) 643-5695
Office hours: TT 9:40-11:10am
E-mail: stankova@math.berkeley.edu
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Head TA: John B. Hough
Office: Evans 739
Office hours: first week of classes – WF 10am-2pm, Th 12:30-1:30pm; the rest TBA.
E-mail: jbhough@math.berkeley.edu

Prerequisites: Three and a half years of high school mathematics.

Discussion Sections: Each student will be assigned to a discussion section. The discussion sessions, as well as lectures, are mandatory.


Homework: See the list of weekly Homework assignments below. HWs will not be graded or collected, but will be due on Wednesdays. Homework solutions will be distributed in discussion sessions on Wednesdays. The TAs will also distribute a handout with notes and hints for all homework assignments.

Quizzes: There will be approximately 12 quizzes in the discussion sections, usually given on Wednesdays. The lowest two quiz scores will be dropped when determining a student’s final grade. If you miss discussion sections when a quiz is taken, you cannot retake the quiz in other section, and your quiz score will be 0. Thus, when you miss discussion sessions (for whatever reasons), keep in mind that only two quiz scores will be dropped. No exceptions will be made to this policy. The quizzes will be based on the current or previous homework assignment.

Exams: There will be two in–class midterm exams: on February 27, 8:00-9:30am, and April 10, 8:00-9:30am; and a final exam on May 24, 8-11am. There will be no make-up midterms or final exams. Every student must take the midterms and the final exam on these dates and at these times. There will be no exceptions. Do not take this class if you have conflicts with any of this exam schedule. A substantial portion of the exams will be based on homework assignments.

Grading: Grades are computed by taking 15% quizzes, 25% each midterm, 35% final. The final letter grades will not be based on a “curve”, but on a score percentage cut-off scale, to be determined by me at the end of the semester. Please, consult the bonus credit appendix for more information and specific examples.

Special Arrangements: If you are a student with a disability registered by the Disabled Student Services (DSS) on UCB campus, and if you require special arrangements during exams, you must provide me with the DSS document and you must contact me via e-mail or in office hours at least 10 days prior to each exam, explaining your circumstances and what special arrangements need to be done. If you do not contact me 10 days in advance, you will have to take the exam along with everyone else and under the regular conditions provided for the class. Please, observe this policy: no exceptions will be made.

Special Arrangements: If you are a student with a disability registered by the Disabled Student Services (DSS) on UCB campus, and if you require special arrangements during exams, you must provide me with the DSS document and you must contact me via e-mail or in office hours at least 10 days prior to each exam, explaining your circumstances and what special arrangements need to be done. If you do not contact me 10 days in advance, you will have to take the exam along with everyone else and under the regular conditions provided for the class. Please, observe this policy: no exceptions will be made.
Reading Assignments: It is the students’ responsibility to read carefully and thoroughly the assigned section(s) from the textbook and review their class notes after each class.

Bonus Work: Exams will consist of regular problems and bonus problems. Bonus problems are not substitutes for regular problems; they are usually harder and designed to provide extra challenge. Your final grade will be calculated via the above formulas using only your “regular” scores. After that, all the bonus credit from exams will be added up separately. Depending on what portion of the total bonus credit you have, and on my estimate of the difficulty of the overall assigned bonus work, your final grade may go up a step. In past experience, about 25% of my students have benefitted from this bonus policy by completing a considerable part of the bonus work. However, I reserve the right to be the sole judge of how much (if at all) any bonus work can boost one’s grade.

This raises a subtle point with the midterm letter grades, as midterms involve both regular and bonus problems. Again, I will first determine your letter grade based on your regular problems, and then I will decide if any bonus credit is enough to increase your letter grade. The important thing to remember is that the midterm letter grades will disappear once I start calculating your final score, and that bonus credit can never decrease your grade! I shall not discuss bonus credit policy or grading policy with students throughout the semester. Thus, please, consult carefully the appendix for more detailed information on grading.

Tentative Plan of the Course¹

1. Jan 21  Preview of Calculus. Functions and Graphs
3. Jan 28  Limits and Limit Laws
4. Jan 30  Definition of Limit. Continuity
5. Feb  4  Continuity Laws. Infinite Limit Laws
6. Feb  6  Tangents and Derivatives
7. Feb 11  Derivative as a Function. Derivatives of Polynomials
8. Feb 13  Derivative of $e^x$. The Product and Quotient Rules
9. Feb 18  Derivatives of Trigonometric Functions. The Chain Rule
10. Feb 20  Applications of the Chain Rule. Implicit Differentiation
12. Feb 27  Midterm I
13. Mar  4  Linear Approximations and Differentials. Applications of Derivatives
14. Mar  6  Maximum and Minimum Values
15. Mar 11  Mean Value Theorem
16. Mar 13  Derivatives and Graphs
17. Mar 18  L’Hospital’s Rule
18. Mar 20  Slant Asymptotes
19. Apr  1  Optimization Problems
20. Apr  3  Applications to Economics. Newton’s Method
21. Apr  8  Antiderivatives
22. Apr 10  Midterm II
23. Apr 15  Areas
24. Apr 17  Definite Integrals
25. Apr 22  Fundamental Theorem of Calculus
26. Apr 24  Total Change Theorem
27. Apr 29  Substitution Rule
28. May  1  The Logarithm Defined as an Integral. Areas Between Curves
29. May  6  Volumes
30. May  8  More Applications
31. May 13  Review for Final Exam

¹Note: Particular topics and dates may change without prior notice, depending on how the course proceeds. Hence, I shall not honor excuses such as “I tried to follow the syllabus, but different topics were covered in class, and that’s why I wasn’t prepared to do well on the quiz/exam this week.” If a student misses class/discussion, it is the student’s responsibility to find out from classmates what is currently covered in class/discussions and to stay on top of the material.
Questions: Please, refer to the following list for contact when you have questions regarding the course. Contacting the wrong people will simply result in redirecting you to the appropriate contact person, and thus, will waste your and our time. TAs are instructed **not** to answer any questions outside of their realm of expertise as listed below. The professor will not answer any math questions on e-mail: professor’s e-mail is only for emergencies.

<table>
<thead>
<tr>
<th>#</th>
<th>Type of Questions</th>
<th>Person to Ask</th>
<th>When and How</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>enrollment and section placement</td>
<td>Head TA</td>
<td>office hours, e-mail</td>
</tr>
<tr>
<td>2</td>
<td>quiz and exam scores, missed handouts</td>
<td>the student’s TA professor</td>
<td>office hours</td>
</tr>
<tr>
<td>3</td>
<td>all other administrative questions</td>
<td>professor</td>
<td>office hours, e-mail</td>
</tr>
<tr>
<td>4</td>
<td>math questions</td>
<td>TAs, professor</td>
<td>discussion sessions, office hours</td>
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<td>5</td>
<td>emergencies only</td>
<td>professor</td>
<td>e-mail, phone</td>
</tr>
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**TAs Contact Information**

<table>
<thead>
<tr>
<th>#</th>
<th>Name</th>
<th>Office Hours</th>
<th>Where</th>
<th>E-mail</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Peter Gerdes</td>
<td>MW 11-12pm</td>
<td>741 Evans</td>
<td><a href="mailto:gerdes@math.berkeley.edu">gerdes@math.berkeley.edu</a></td>
</tr>
<tr>
<td>2</td>
<td>Tathagata Basak</td>
<td>T 10-11am, F 3-4pm</td>
<td>812 Evans</td>
<td><a href="mailto:tathagat@math.berkeley.edu">tathagat@math.berkeley.edu</a></td>
</tr>
<tr>
<td>3</td>
<td>Nirit Sandman</td>
<td>MF 3-4pm</td>
<td>1058 Evans</td>
<td><a href="mailto:nsandman@math.berkeley.edu">nsandman@math.berkeley.edu</a></td>
</tr>
<tr>
<td>4</td>
<td>Tamas Kalman, PDP</td>
<td>MW 2-4pm, F 2-3pm</td>
<td>1060 Evans</td>
<td><a href="mailto:kalman@math.berkeley.edu">kalman@math.berkeley.edu</a></td>
</tr>
<tr>
<td>5</td>
<td>Crystal Hoyt</td>
<td>TTh 11-11am</td>
<td>714 Evans</td>
<td><a href="mailto:crystal@math.berkeley.edu">crystal@math.berkeley.edu</a></td>
</tr>
<tr>
<td>6</td>
<td>Benjamin E. Johnson</td>
<td>TW 10-11am</td>
<td>854 Evans</td>
<td><a href="mailto:benjamin@math.berkeley.edu">benjamin@math.berkeley.edu</a></td>
</tr>
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</table>

**Discussion Sections**

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<tr>
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<tr>
<td>54306</td>
<td>101</td>
<td>MWF 0800-0900</td>
<td>0087 EVANS</td>
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<tr>
<td>54312</td>
<td>103</td>
<td>MWF 0900-1000</td>
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<td>54318</td>
<td>105</td>
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<td>54321</td>
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<td>0085 EVANS</td>
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<td>C230 STEPHENS</td>
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<td>F 0200-0300</td>
<td>C230 STEPHENS</td>
<td>Kalman, T</td>
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</table>

**Homework Assignments**

**HW1.** Due January 29. Read §1.1-1.3, §2.1-2.2. Solve and Write Problems:
- §1.1: #2,10,14,18,26,28,38,42.
- §1.2: #2,8,10,12,14,16,18.
- §2.1: #2,4,6,8.
- §2.2: #6,8,12,14,26,36(a)-(b).

**HW2.** Due February 5. Read §1.5-1.6, §2.2-2.5. Solve and Write Problems:
- §2.3: #2,4,14,20,26,28,32(b)(c),42,48.
- §2.4: #2,4,6,12,13,16,24.
- §2.5: #4,6,38,42,43.

**HW3.** Due February 12. Read §2.5-2.8. Solve and Write Problems:
- §2.5: #44,46,48,52(a),54(a).
- §2.6: #4,6,12,16,18,26,52,60.
- §2.7: #2,6(a)(i),6(b),10,12.
- §2.8: #4,6,8,10(a),18,22.
HW4. Due February 19. Read §2.9, §3.1-3.2, skim §3.3. Solve and Write Problems:
§2.9: #2,4,6,8,12,28,30,38; Review, pp.178: #38,46.
§3.1: #12,16,22,24,30,42,46,56.
§3.2: #2,4,6,12,20,32,42.

HW5. Due February 26. Read §3.4-3.6, §3.8-3.9. Solve and Write Problems:
§3.4: #2,10,16,22,30.
§3.5: #3,8,10,20,22,34,46,52*,58.
§3.6: #6,10,18,22*,26,30,48,50.
§3.8: #4,6,12,14,32,40,44.

HW6. Due March 5. Read §3.5-3.9. Solve and Write Problems:
§3.5: #38,42,48(a).
§3.6: #29,35,42,44.
§3.7: #2,4,8,16,24,34,40,48.
§3.8: #28,46,47.
§3.9: #30, 32, 40*.

HW7. Due March 12. Read §3.11, §4.1. Solve and Write Problems:
§3.11: #4,8,10,18,22,26,36.
Review for Chapter 3, p.275: #2,12,14.
§4.1: #4,6,10,14,18,20,22,24,26,32,36,38,40,46.

HW8. Due March 19. Read §4.2-4.3. Solve and Write Problems:
§4.2: #2,4,6,8,10,12,14,16,18,19,21(a),24,30,31,32.
§4.3: #2,6,8,12,14,20,22,32,34,38,42.

HW9. Due April 2. Read §4.4-4.5. Solve and Write Problems:
§4.4: #6,10,12,18,22,24,26,28,30,32,40,36,42,44,46,48,50,56.
§4.5: #10,12,14,30,60,62,64.

HW10. Due April 9. Read §4.7-4.9. Solve and Write Problems:
§4.7: #2,4,6,8,10,12,16,18,22.
§4.8: #2,4,6,8,10,12,14,16,18,20.
§4.9: #2,4,6,12,14,36.

HW11. Due April 16. Read §4.10. Solve and Write Problems:
§4.10: #4,8,10,12,16,18,22,28,32,34,40,42,44,46,48,62,68,74,76,78.

HW12. Due April 23. Read §5.1-5.2, Appendix E(p.A38). Solve and Write Problems:
App. E: #6,10,16,22,30,36.
§5.1: #2,4,18,20,22.
§5.2: #2,6,8,12,18,20,34,38,40,47,48,52,54,62.

HW13. Due April 30. Read §5.3-5.4. Solve and Write Problems:
§5.3: #4,8,10,16,22,26,30,32,40,42,50,52,62,66.
§5.4: #2,4,22,28,38,40,44,48,54,56,58.

HW14. Due May 7. Read §5.5-5.6, §6.1. Solve and Write Problems:
§5.5: #2,4,6,8,12,14,18,24,28,32,38,42,52,56,58,64.
§5.6: #2,4.
§6.1: #2,4,10,14,16,24,45.

HW15. Due May 14. Read §6.2, §6.5. Solve and Write Problems:
§6.2: #2,4,10,12,14,16,18,32,34,36,40,44,48,49,54,56.
§6.5: #2,4,5,6,8,10,14,18,19.
Appendix on Bonus versus Regular Credit

The main points of the scoring (regular and bonus) are illustrated below via three hypothetical examples. 100r means “100 regular points”, 20b means “20 bonus points”. Student X, Y and Z receive the following scores:

<table>
<thead>
<tr>
<th>Student</th>
<th>Total</th>
<th>Midterm 1</th>
<th>Midterm 2</th>
<th>Final Exam</th>
<th>Quizzes</th>
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<tr>
<td></td>
<td>100r, 20b</td>
<td>100r, 20b</td>
<td>140r, 27b</td>
<td>200r</td>
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<tr>
<td>Student X</td>
<td>85r, 8b</td>
<td>92r, 12b</td>
<td>128r, 2b</td>
<td>110r</td>
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<tr>
<td>Student Y</td>
<td>95r, 10b</td>
<td>95r, 19b</td>
<td>114r, 11b</td>
<td>123r</td>
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<td>Student Z</td>
<td>90r, 14b</td>
<td>95r, 20b</td>
<td>134r, 22b</td>
<td>130r</td>
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To calculate final percentages, use the weight formulas

\[
\frac{20(M1 + M2 + F) + 6Q}{80} \text{ for regular points, and } \frac{3(M1 + M2 + F)}{40} \text{ for bonus %.}
\]

<table>
<thead>
<tr>
<th>Total</th>
<th>Regular% max 100%</th>
<th>Regular Grade</th>
<th>Bonus% max 5%</th>
<th>Adjusted % max 105%</th>
<th>Final Grade</th>
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<tbody>
<tr>
<td>Student X</td>
<td>84.50%</td>
<td>B+</td>
<td>1.65%</td>
<td>86.15%</td>
<td>B+</td>
</tr>
<tr>
<td>Student Y</td>
<td>85.23%</td>
<td>B+</td>
<td>3.00%</td>
<td>88.23%</td>
<td>A−</td>
</tr>
<tr>
<td>Student Z</td>
<td>92.00%</td>
<td>A−</td>
<td>4.20%</td>
<td>96.20%</td>
<td>A</td>
</tr>
</tbody>
</table>

Important points to remember: All numbers above are made solely for the sake of this example.

1. The “weight formulas” are made under the assumption that the maximal total scores for the exams and quizzes are as shown in the second row of the table. These totals may change somewhat during this particular course; hence you can imagine that there will be a different weight formula reflecting again the relative weight of 25% each midterm, 35% final exam and 15% quizzes.

2. The “regular grades” in the table above are determined solely on the regular scores, according to the following hypothetical cut-off points: • A: above 94%; • A−: above 88%; • B+: above 83%, and so on. The cut-off points for this course will most probably be different, and they will be determined solely by me at the end of the semester.

3. The bonus total is set for 5% in the example, and is subject to change depending on my estimate of the overall difficulty of the bonus exercises.

4. The final grades are computed first based solely on the regular points. Only then the bonus adjustment is made, and whoever gets into the next grade range receives a grade bump. For example, student X did not have sufficient bonus work to make the bracket for A−, so no raise here; on the other hand, students Y and Z got bumps in their final grades since they entered the next grade brackets with their bonus work.

5. On the actual grading for this class, a bump of more than one step on account of bonus will not be allowed, e.g. B to A- will not be possible, but B+ to A- will be possible.

6. Note that one can actually end up with more than 100% total, which will result in one simple A+. Finally, one can earn 100% without doing any bonus problems.

The reason for the above unconventional grading system is two-fold:

- To give a chance to medium and poor students to be able to get the best grade they can get without feeling any extra pressure to do harder problems.
- To give an incentive to more advanced students to do harder problems and challenge themselves to the level of their own ability.

The traditional bonus systems do in effect one of two things: either equalize very hard with not so hard problems (by giving students a choice of, say, 5 out of 7 problems on the exams), or force weaker students to sweat over very hard problems (by adding up all scores on exams). However, I want to be fair to all groups of students as much as possible. If one really wants to be fair to everyone, a more complicated system has to be designed, and the one described above is the best system I can think of in terms of fairness to everyone.

Remember that I and the TAs will not discuss any grading or bonus policies during the semester. You are smart students - you can answer all your questions regarding grading policies from the examples above.