

**MATH 203**  
Differential & Integral Calculus I  
*Winter 2007*

Instructor: \_\_\_\_\_

Office/Tel No.: \_\_\_\_\_

Office Hours: \_\_\_\_\_

**Course Examiner:** Dr. H. Proppe, Email: [proppe@alcor.concordia.ca](mailto:proppe@alcor.concordia.ca)

**Text:** *Single Variable Calculus*, by James Stewart, 5th Edition, Brooks/Cole.

**Prerequisite:** MATH 201 or an equivalent Functions course.

**Calculators:** Calculators are not permitted in the class test and final examination.

**Math Help Centre:** The Centre has been organized to help students in solving problems. A schedule of its operation and its location will be posted in the Department. The Centre is staffed by graduate students. If you are having difficulty with the material, your professor is also available during his/her office hours to give a reasonable amount of help. Note, however, that if you do not attend a class it is not reasonable to expect your professor to cover the missed material for you.

**Assignments and Solutions:** Students are expected to submit assignments weekly. Some (but not all) questions will be marked. Late assignments will *not* be accepted. Working on assignment questions and other selected problems is essential. There is not enough class time to do all the examples needed for a good understanding of the material, and so students are strongly encouraged to do as many problems on their own as their time permits. The suggested supplementary problems included in this outline are specially selected to complement the assignments. Solutions to the even-numbered assignment problems will be available at Copies Concordia on the downtown campus about 1 week after the due date. These solutions, together with this outline, will also be posted electronically on the course's Moodle website, which is accessible through your portal. It is called MATH 203/2 (Fall, 2006): MATH 203 Core Materials. Note, however, that the on-line solutions cannot be printed or copied. In addition, a solutions manual for all odd-numbered questions is packaged with the text to provide quick and thorough feedback.

**Test:** There will be one midterm test in Week 7.  
**PLEASE NOTE:** It is the Department's policy that tests missed for any reason, *including illness*, cannot be made up. If you miss a test, the final exam can count for 100% of your final grade.

- Final Exam:** The final examination will be three hours long.  
**PLEASE NOTE:** Students are responsible for finding out the date and time of the final exams once the schedule is posted by the Examinations Office. Any conflicts or problems with the scheduling of the final exam must be reported directly to the Examinations Office, *not* to your instructor. It is the Department's policy and the Examinations Office's policy that *students are to be available until the end of the final exam period.*  
*Conflicts due to travel plans will not be accommodated.*
- Final Grade:** The final grade will be based on the higher of (a) or (b) below:  
a) 10% for the assignments, 15% for the midterm test, and 75% for the final.  
b) 100% for the final examination.
- Important Message:** Although it is possible to pass the course just by writing the final examination, students are strongly advised to do and submit all assignment questions, and to write the midterm test. Experience has shown that students who do not attend class and think they can keep up with the material on their own do very poorly on the final examination.
- Note:** All of Chapter 1 (except section 1.4) is a review of material that was covered in prerequisite courses, and is required for this course. Because it is only a review, the topics are not covered in any detail – in fact, some are skipped and done only later when they are needed. If you don't know this preliminary material thoroughly, it is particularly important that you learn it through assignment questions and supplementary problems. If you still feel you don't know it well enough after the first week (you should also try the quiz at the very end of this document) you may want to consider dropping the course and taking MATH 201 instead. Section 1.4 is for students who want to use a graphing calculator to help with assignments and practice problems. Remember, however, that no calculators are allowed for the test or final examination.

Week	Topics	Assignments
1 (Review of functions)	1.1 Representations of functions	p.22: 2, 6, 20, 26, 34,
	1.3 New functions from old	p.45: 4, 18, 40
	1.5 Exponential functions	p.62: 12, 14,
	1.6 Inverse and logarithmic functions	p.74: 20, 28, 36, 38, 40, 50
2	2.2 Limit of a function	p.102: 8, 14, 26
	2.3 Calculating limits	p.111: 14, 22, 26, 40
	2.6 Limits at infinity	p.146: 8, 12, 16, 22
3	2.5 Continuity	p.133: 10, 20, 38, 42
	2.7 Tangents and velocities	p.155: 8, 18, 20
	2.8 Derivatives	p.163: 2, 6, 18, 20, 26
4	2.9 Derivative as a function	p.173: 4, 12, 24, 30
	3.1 Derivatives of polynomials and exp.	p.191: 6, 10, 18, 22, 28, 30, 40
	3.2 Product and quotient rules	p.197: 4, 8, 10, 14, 20
5	App.D Trigonometric functions (review)	p.A32 32, 54, 88
	1.6 Inverse Trigonometric Functions	p.77 68, 72
	3.4 Derivatives of trigonometric functions	p.216: 8, 10, 16, 18, 24, 36
	3.5 Chain Rule	p.224: 6, 12, 20, 24, 38, 40
6	3.6 Implicit differentiation; Derivatives of Inverse Trigonometric Functions	p.233: 2, 12, 20, 30, 42, 44, 46
	3.8 Derivatives of logarithmic functions	p.249: 6, 12, 16, 32, 38, 42
7	<b>Class Test</b>	
8	3.7 Higher derivatives	p.240: 4, 12, 14, 20, 34, 36
	3.10 Related rates	p.260: 6, 8, 12, 18, 34
9	3.11 Linear approximations, differentials	p.267: 6, 8, 20, 24, 36, 42
	4.1 Maximum/minimum values	p.285: 6, 10, 30, 42, 46, 62
10	4.2 Mean Value Theorem	p.295: 4, 12, 18, 24,
	4.3 Shape of graphs	p.304: 8, 18, 22, 30, 36,
11	4.4 Indeterminate forms; L'Hôpital's Rule	p.313: 8, 18, 26, 38, 42, 48, 60
12	4.5 Summary of curve sketching	p.323: 6, 12, 30, 42
13	4.7 Optimization problems	p.336: 2, 4, 6, 10, 24, 30, 44
13	<b>Review - tutorials</b>	

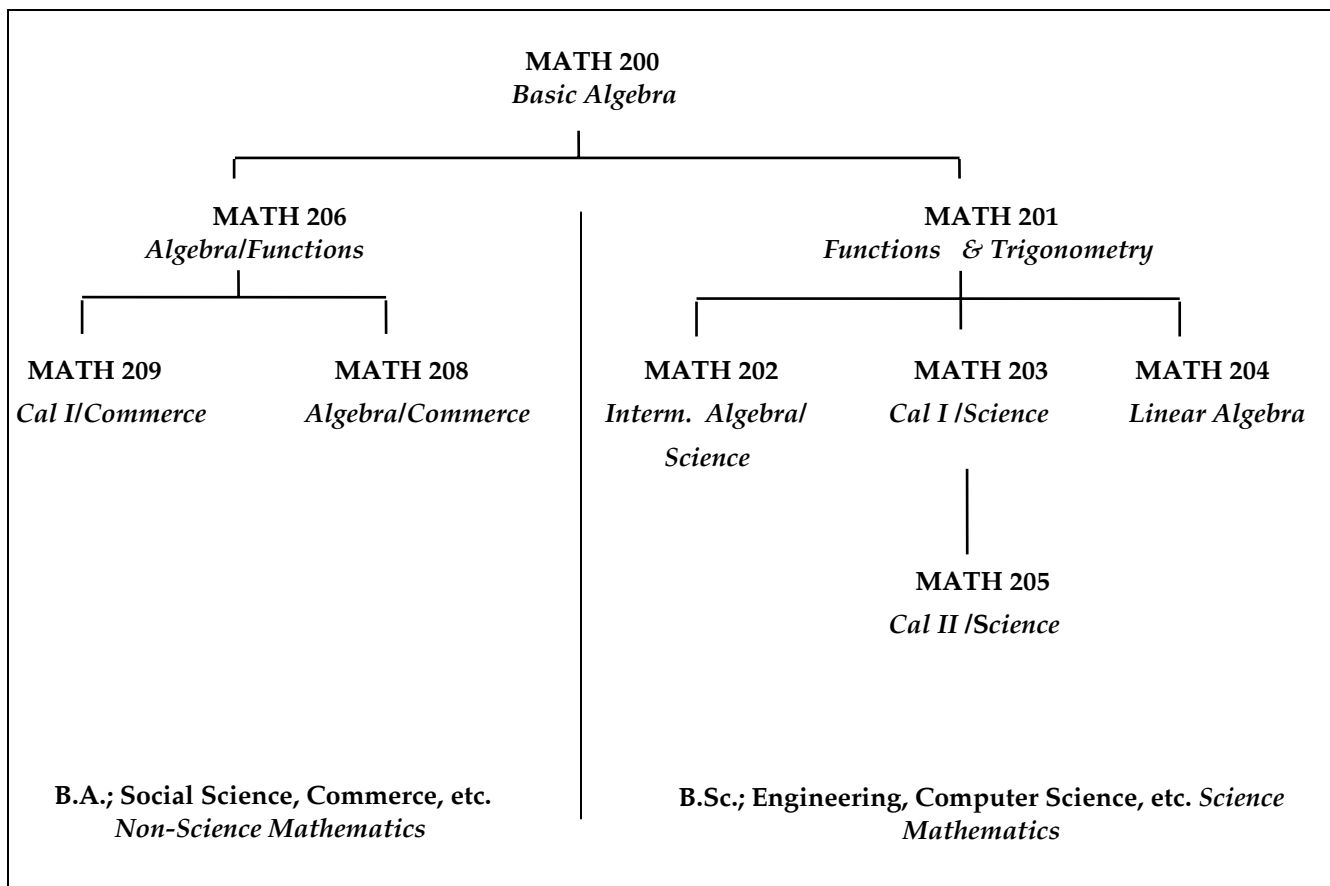
**Supplementary Problems**

Week	Topics	Supplementary Problems
1 (Review of functions)	1.1 Representations of function	p.22: 43, 47, 51, 53, 61, 65
	1.3 New functions from old	p.45: 3, 31, 39, 43
	1.5 Exponential functions	p.62: 9, 11, 15, 17, 25
	1.6 Inverse and logarithmic functions	p.74: 23, 27, 51, 61
2	2.2 Limit of a function	p.102: 5, 25, 27
	2.3 Calculating limits	p.111: 11, 21, 23, 35, 43
	2.6 Limits at infinity	p.146: 15, 21, 25
3	2.5 Continuity	p.133: 15, 19, 37, 41
	2.7 Tangents and velocities	p.155: 11
	2.8 Derivatives	p.163: 7, 17
4	2.9 Derivative as a function	p.173: 9, 25, 27, 29
	3.1 Derivatives of polynomials and exp.	p.191: 11, 15, 19, 25, 27, 47
	3.2 Product and quotient rules	p.197: 11, 13, 19, 25
5	App.D Trigonometric functions (review)	p.A32 67, 69
	3.4 Derivatives of trigonometric functions	p.216: 5, 9, 13, 17, 23, 37, 43
	3.5 Chain Rule	p.224: 7, 11, 23, 37, 41
6	3.6 Implicit differentiation	p.233: 7, 15, 29, 43, 47
	3.8 Derivatives of logarithmic functions	P.249: 5, 15, 19, 31, 43, 45
7	<b>Class Test</b>	
8	3.7 Higher derivatives	p.240: 9, 19, 31, 39
	3.10 Related rates	p.260: 7, 9, 11, 23, 31
9	3.11 Linear approximations, differentials	p.267: 7, 17, 19, 25, 29, 45
	4.1 Maximum/minimum values	p.285: 23, 39, 41, 53, 55, 59
10	4.2 Mean Value Theorem	p.295: 13, 19, 25, 29
	4.3 Shape of graphs	p.304: 13, 19, 35, 41, 45, 49
11	4.4 Indeterminate forms; L'Hôpital's Rule	p.313: 21, 33, 37, 41, 47, 53, 57
12	4.5 Summary of curve sketching	p.323: 15, 19, 25, 27, 41, 47, 49
13	4.7 Optimization problems	p.336: 9, 17, 19, 25, 33, 57

## Choosing Between MATH 201 and MATH 203

If the last mathematics course you took was at the high school level (Quebec), and more than five years have passed since, you should probably register for MATH 200. If you are still unsure of your level, read on.

### Math Courses at Concordia



A self-administered test to help you decide between MATH 201 and MATH 203 follows. Give yourself about 30 minutes to complete the test. Be honest with yourself, since registering in the wrong course may cost you money and result in a poor grade. Remember that all university-level courses usually demand quite a bit of your time. Students in MATH 203 will find they will not have time once the course begins to review material that they are expected to know before they enter the course.

**Help:** The Department of Mathematics and Statistics runs a drop-in **Math Help Centre** in **LB 912** - call the Department's office for further information at 848-2424 ext. 3222/3223. Counseling and Development runs mathematics skills workshops, 2 or 3 times a week (call the Counseling and Development's office for further information at 848-2424, ext. 3545/3555).

Scoring: 10 or less = MATH 201; 11-14 = see an advisor; 15 or better = MATH 203. Answers are on the last page.

**MATH 203  
Qualifying Test**

1) What is the equation, in *slope-intercept* form, of the line whose slope is 7 and whose *y-intercept* is -3?

- a)  $y = -3x + 7$                       b)  $y = 7x - 3$   
c)  $y = 7x + 21$                      d)  $y = 7x - 21$   
e)  $y = -7x + 3$

2) What is the slope of any line *parallel* to the line  $5x + 6y = 30$ ?

- a)  $-\frac{6}{5}$             b)  $-\frac{5}{6}$             c) 0                d)  $\frac{5}{6}$             e)  $\frac{6}{5}$

3) The lines  $-4x + 5y = -10$  and  $5x + ky = 12$  are perpendicular. What is the value of  $k$ ?

- a) -5                b) -4                c) 4                d) 5                e) 10

4) Find the coordinates of the *midpoint*  $M$ , and the *length*  $L$  of the line segment joining the points  $(3, -2)$  and  $(4, -1)$ . Answer in simple radical form.

- a)  $M\left(\frac{7}{2}, -\frac{3}{2}\right), L = \sqrt{2}$             b)  $M\left(\frac{7}{2}, \frac{3}{2}\right), L = \sqrt{3}$             c)  $M\left(\frac{1}{2}, -\frac{1}{2}\right), L = \sqrt{2}$   
d)  $M\left(-\frac{1}{2}, \frac{1}{2}\right), L = \sqrt{2}$             e)  $M\left(\frac{1}{2}, -\frac{1}{2}\right), L = \sqrt{3}$

5) What is the equation of the line having a slope of 0 and passing through the point  $(-6, -1)$ ?

- a)  $x = -6$                       b)  $x = -1$                       c)  $y = -6$   
d)  $y = -1$                       e)  $y = \frac{1}{6}$

6) Factor:  $2x^2 + 11x + 15$

- a)  $(2x+3)(x+5)$                       b)  $(x+3)(x+5)$                       c)  $(2x+15)(x+1)$   
d)  $(2x+5)(x+3)$                       e)  $(2x+1)(x+15)$

7) The expression  $x^2 - 10kx + R$  is a perfect square. Find the value of  $R$ .

- a) 25                      b)  $5k^2$                       c)  $25k^2$   
d)  $100k^2$                       e)  $25k^2x^2$

8) Consider solving  $x^2 + 12x + 5 = 0$  by completing the square:  $x^2 + 12x + \underline{\hspace{1cm}} = -5 + \underline{\hspace{1cm}}$   
What is the number that goes in the blanks?

- a) 144            b) 36            c) 16            d) -16            e) -36

9) Solve  $3x^2 - 5x - 1 = 0$  using the Quadratic Formula.

- a)  $\frac{-10 \pm \sqrt{101}}{3}$       b)  $\frac{-5 \pm \sqrt{37}}{6}$       c)  $\frac{5 \pm \sqrt{37}}{6}$   
 d)  $\frac{10 \pm \sqrt{101}}{9}$       e)  $\frac{10 \pm \sqrt{101}}{3}$

10) The graph of the parabola  $y = x^2 + 6x + 13$  is symmetric about a line. What is the equation of that line?

- a)  $x = -3$       b)  $x = 0$       c)  $x = 3$   
 d)  $y = 0$       e)  $y = 3$

11) What is the equation of the circle centered at  $(4, -5)$  with a radius of 16?

- a)  $(x + 4)^2 + (y - 5)^2 = 16$       b)  $(x - 4)^2 + (y + 5)^2 = 4$   
 c)  $(x + 4)^2 + (y - 5)^2 = 256$       d)  $(x - 4)^2 + (y + 5)^2 = 256$   
 e)  $(x + 4)^2 + (y - 5)^2 = 4$

12) Determine which of the following triangles are right triangles if the sides' lengths are:

- I) 8, 15, 17    II) 4, 5, 6      III) 2, 2, 3      IV) 9, 12, 15

- a) I only      b) II only      c) III only      d) I and IV only      e) I, II and IV

13) A triangle ABC has right angle B. Sides AB and BC have the lengths 3 and 4 respectively. Determine the cosine of angle A ( $\cos A$ ).

- a)  $\frac{3}{5}$       b)  $\frac{3}{4}$       c)  $\frac{4}{5}$       d)  $\frac{4}{3}$       e)  $\frac{5}{3}$

14) Which of the following ratios is the tangent of an angle?

- a)  $\frac{\text{opposite}}{\text{hypotenuse}}$       b)  $\frac{\text{hypotenuse}}{\text{adjacent}}$       c)  $\frac{\text{adjacent}}{\text{hypotenuse}}$   
 d)  $\frac{\text{hypotenuse}}{\text{opposite}}$       e)  $\frac{\text{opposite}}{\text{adjacent}}$

15) What is the value of  $\sin \frac{2\pi}{3}$ ?

- a)  $\frac{1}{2}$       b)  $-\frac{1}{2}$       c)  $\frac{\sqrt{3}}{2}$       d)  $\frac{-\sqrt{3}}{2}$       e)  $\frac{\sqrt{2}}{2}$

16) What is the value of  $\cot \frac{3\pi}{2}$ ?

- a) 0      b) 1      c) -1      d)  $\frac{\sqrt{2}}{2}$       e) does not exist

17) What is the value of  $\log_2 64$ ?

- a) 6      b) 8      c) 16      d) 128      e) 4096

18) Which of the following is equal to  $\log_k A = \frac{3}{2}$ ?

- a)  $k = \sqrt[3]{A}$       b)  $k = \left(\frac{3}{2}\right)^A$       c)  $\frac{3}{2} = \sqrt[3]{A}$       d)  $A = \sqrt[3]{\frac{3}{2}}$       e)  $A = \sqrt{k^3}$

19) Write as a single logarithm:  $\log_8 5 - 2\log_8 6$

- a)  $\log_8 \frac{5}{36}$       b)  $\log_8 \frac{5}{12}$       c)  $\log_8 11$       d)  $\log_8 41$       e)  $\log_8 180$

20) What is the result when  $\log \frac{AB}{\sqrt{C}}$  is expanded?

- a)  $\log A + \frac{1}{2}(\log B - \log C)$       b)  $\frac{1}{2}(\log A + \log B - \log C)$   
c)  $\log A + \log B - 2\log C$       d)  $\frac{1}{2}(\log A \log B - \log C)$   
e)  $\log A + \log B - \frac{1}{2}\log C$

**ANSWERS:** 1. b); 2. b); 3. c); 4. a); 5. d); 6. d); 7. c); 8. b); 9. c); 10. a); 11. d); 12. d); 13. a); 14. e); 15. c); 16. a); 17. a); 18. e); 19. a); 20. e)