Department of Mathematics & Statistics
Concordia University

MATH 203
Differential & Integral Calculus I
Winter 2016

Instructor*: _____

Office/Tel No.: _____

Office Hours: _____

*Students should get the above information from their instructor during class time. The instructor is the person to contact should there be any questions about the course.

Textbook: *Single Variable Calculus,* by James Stewart, 8th Edition (Customized);

Prerequisite: Math 201 or an equivalent Calculus I course.

Office Hours: Your professor will announce her/his office hours during which she/he will be also available to give a reasonable amount of help. Note, however, that if you missed a class it is not reasonable to expect your professor to cover the missed material for you.

Tutorials: The material in this course requires a lot of practice. There is not enough class time to do all the examples and problems needed to learn the material thoroughly. The Department has therefore organized several tutorial sessions per week for one hour each (see tutorial schedule) to provide additional support to students outside the lecture class time. Tutorials are interactive problem-solving sessions conducted by tutors who will help with the topics learned in class that week, with particular emphasis on the material that students may have difficulties with. Students are strongly encouraged to participate and be active at the tutorial sessions. They are an important resource to help you succeed in this course. Students may attend any tutorial.

Math Help Centre: In addition to tutorials, a Math Help Centre staffed by graduate students is available. The schedule of its operation will be posted in the Department and on the Department webpage: https://www.concordia.ca/artsci/math-stats/services/math-help-centre.html.

WeBWorK: Every student will be given access to an online system called **WeBWorK**. The system provides you with many exercises and practice problems. Students will use this system to do online assignments (see **Assignments** below). In addition, before the midterm test and a before the final exam, a number of practice problems will be posted in WeBWorK to help you review the material of the course.

Assignments: Students are expected to submit assignments online using **WeBWorK**. Late assignments **will not** be accepted. Assignments contribute 10% to your final grade. Working regularly on the assignments is essential for success in this course. Students are also strongly encouraged to do as many problems as their time permits from the list of recommended problems included in this outline, as well as practice problems. A solutions manual for all odd-numbered questions is packaged with the textbook.

Calculators: Only calculators approved by the Department (with a sticker attached as a proof of approval), such as **Sharp EL 531** or the **Casio FX 300MS**, available at the Concordia Bookstore, are permitted for the class test and final examination. See http://www.concordia.ca/artsci/math-stats/services.html#calculators for a list of approved and non-approved calculators.

Midterm Test: There will be one **midterm test,** based on the material of weeks 1-6, which will contribute up to 25% to your final grade (see the **Grading Scheme** below). The test will be **common** for all sections of this course and will be held on **Saturday, March 5, 2016 at 10:00 A.M.** Students who will not be able to write the test that day for a valid reason, e.g. religious (to be reported to the section's **instructor** in advance) or illness (***a valid medical note required***), may write an alternate midterm test on **Sunday, March 13, 2016 at 10:00 A.M.**

NOTE: It is the Department's policy that tests missed for any reason, **including illness,** cannot be made up. If you miss both the midterm and alternate test **because of illness *(medical note required)*** the final exam will count for 90% of your final grade, and the Assignments will count for the remaining 10%.

Final Exam: The final examination will be three hours long and will cover all the material in the course. **NOTE:** Students are responsible for finding out the date and time of the final exams once the schedule is posted by the Examinations Office. 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.**

Grading Scheme: The final grade will be based on the higher of (a) or (b) below:

a) 10% for the assignments,
25% for the midterm test,
65% for the final exam.

b) 10% for the assignments,
10% for the midterm test,
80% for the final exam.

IMPORTANT: **PLEASE NOTE THAT THERE IS NO "100% FINAL EXAM" OPTION IN THIS COURSE**.

CONTENTS

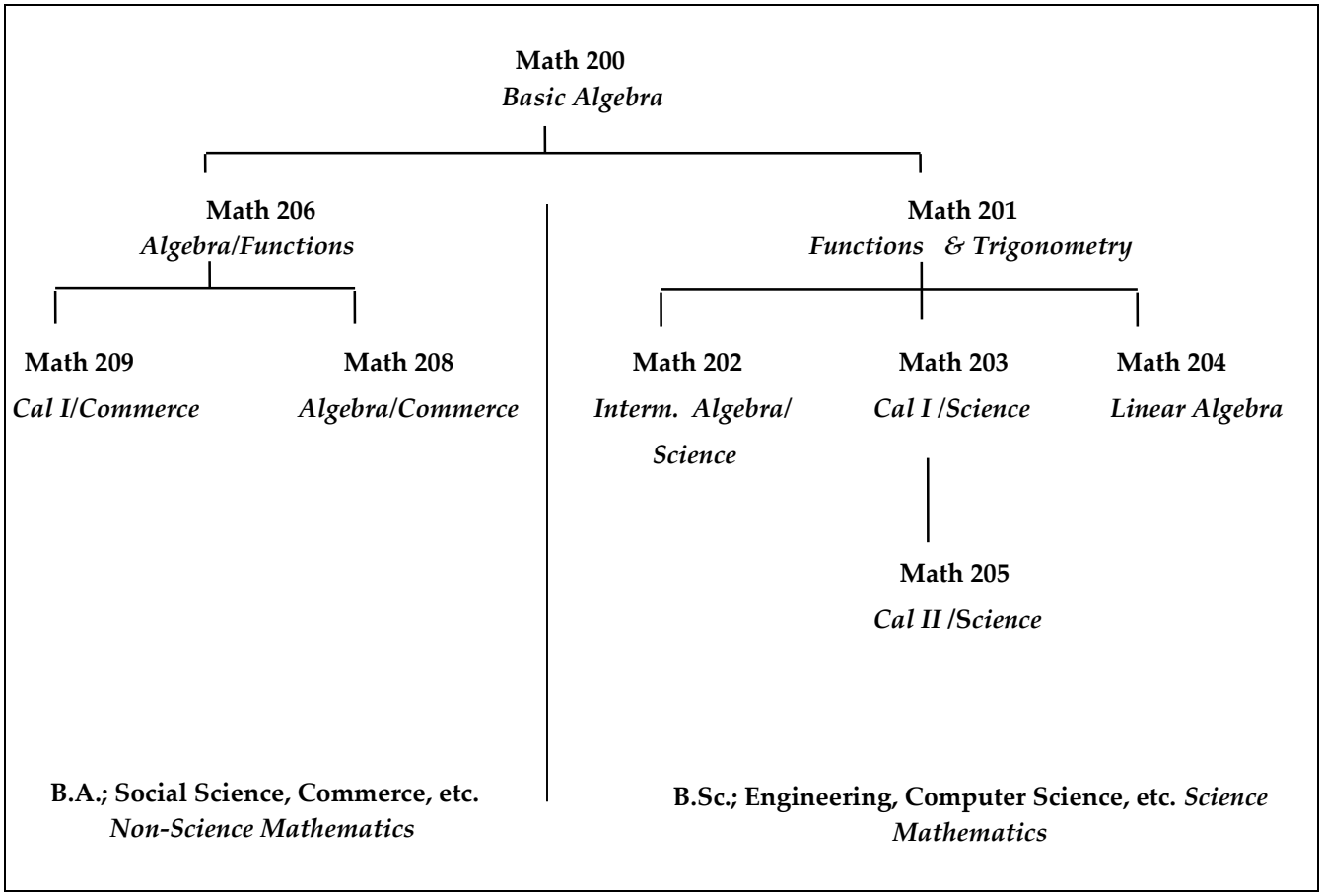
Note: All of Chapter 1 is a review of material that is covered in prerequisite courses, and is important for this course. The material that is skipped in this review will be introduced briefly later in the course when needed. If you don't know this preliminary material thoroughly, it is particularly important that you learn it through the assignment questions and recommended problems. If you still feel you don't know it well enough after the first class or so (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.

Weeks	Topics		Recommended Problems
1	1.1 Representations of functions	p.19:	3, 5, 7, 23, 25, 29, 33, 49, 51
(Review of	1.2 A catalogue of functions	p.33	1, 3, 5, 9, 13, 15, 19
functions)	1.3 New functions from old	p.42:	3, 11, 15, 21, 23, 33, 35, 43, 57
2	2.1 The tangent and velocity problems	p.82:	3, 5, 7
	2.2 The limit of a function	p.92:	5, 7, 11, 21, 33, 39
	2.3 Calculating limits using the limit laws	p.102:	5, 11, 13, 17, 25, 27, 31, 45, 51
	2.6 Limits at infinity, horizontal asymptotes	p.137:	3, 7, 13, 15, 17, 21, 25, 29, 37
3	2.5 Continuity	p.124:	3, 17, 19, 21, 23, 41, 45, 47
	2.7 Derivatives and rates of change	p.148:	5, 7, 17, 21, 23, 31, 35
	2.8 Derivative as a function	p.160:	3, 21, 25, 39, 47
4	1.4 Exponential functions	p.53:	3, 9, 11, 17, 21, 23
	1.5 Inverse functions and logarithms	p.66:	9, 11, 21, 37 41, 57
5	3.1 Derivatives of polynomials and expon.	p.180:	9, 11, 17, 21, 23, 29, 43, 47
	3.2 Product and quotient rules	p.188:	3, 7, 9, 11, 13, 19, 27
	App. D Trigonometry (an overview)	p.A32	3, 9, 13, 29, 31, 49, 51, 65, 69, 71
6	3.3 Derivatives of trigonometric functions	p.196:	3, 7, 11, 13, 19, 23, 31, 37
	3.4 Chain Rule	p.204:	5, 11, 13, 19, 23, 31, 35, 37, 45, 53, 77
	Pre-Midterm Review (time permitting)		
7	3.5 Implicit differentiation	p.215:	9, 15, 17, 25, 27, 29, 31, 37
	3.6 Derivatives of logarithmic functions	p.223:	5, 7, 15, 19, 23, 31, 43, 45, 49
8	3.8 Exponential growth/decay	p.242	3, 9, 11, 13, 17, 19
	3.9 Related rates	p.249:	3, 5, 11, 13, 15, 17, 23, 31, 33
	3.10 Linear approximations and Differentials	p.256:	1, 5, 11, 13, 17, 19, 31, 33, 37
9	4.1 Maximum/minimum values	p.283:	7, 25, 31, 37, 43, 51, 61
10	4.2 Mean Value Theorem	p.291:	3, 9, 11, 17, 19, 21, 25
	4.4 Indeterminate forms; L'Hôpital's Rule	p.311:	9, 11, 17, 19, 27, 41, 47, 51
11	4.3 Shape of graphs	p.301:	9, 11, 15, 17, 19, 21
	4.5 Summary of curve sketching	p.321:	5, 13, 23, 29, 45
12	4.7 Optimization problems	p.336:	7, 13, 15, 19, 21, 23, 29, 33, 37
13	**REVIEW**		

Choosing Between Math 201 and Math 203

If the last math 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.

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: $x^2 + 12x +$ ____ = –5 + ____
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) $\frac{3}{2} = \sqrt[k]{A}$ d) $A = \sqrt[k]{\frac{3}{2}}$ 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)