Department of Mathematics & Statistics
Concordia University

MATH 203
Differential & Integral Calculus I
Fall 2025

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: *Thomas' Calculus: Early Transcendentals, Single Variable.*
The hard-copy text can be purchased at the Concordia bookstore, https://www.bkstr.com/concordiastore/home.
The e-text is found in the MyLabMath system the access card to which can be purchased at https://pearsonhighered.onthehub.com/WebStore/OfferingDetails.aspx?o=732ac655-d958-ef11-8168-000d3af41938&pmv=00000000-0000-0000-0000-000000000000
NOTE that the Concordia bookstore can price-match the prices found on the Pearson site.

Prerequisite: MATH 201 or an equivalent Functions course.

Pre-test: A special Pre-test is posted on the META MATH-203 Moodle site of this course to help students determine if their prerequisite mathematical background is strong enough to take this course successfully. Students are encouraged to go to the Meta site, read "README: About the Pre-test" file and then take the test itself to see where they stand. The results of the test may be used by the course coordinator to advise students on what remedial actions students can take if they perform poorly on this pre-test.

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: It takes a great deal of practice to succeed in this course. To complement lectures, the Department has organized weekly tutorials, which are conducted by tutors who will help with solving problems on the topics learned in class that week, with emphasis on the material that students may have particular difficulties within this course. Students may attend either of the scheduled tutorials and are strongly encouraged to actively participate in these problem-solving sessions which can help very significantly to students' success in this course.

Math Help Centre: A Math Help Centre staffed by graduate students is available. The schedule of its operation and its location 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 offers many exercises and practice problems. Students must use this system to do online assignments (see Assignments below). Before each exam (midterm and final), numerous practice problems will be posted on **WeBWorK** to aid students in their preparation.

MyLab Math: Every student who purchases the e-text will be given access to one more online system called **MyLab Math**. This system contains an e-version of the textbook, as well as a large number of various resources, like practice exercises, and typical examples on different topics, often with solutions, video materials, etc., that help you master the course material.

Assignments: Students are expected to submit assignments online using **WeBWorK**. Late assignments **will not** be accepted. Assignments contribute 10% to the final grade. Working regularly on the assignments is essential for success in this course. Students are also strongly advised to work on the practice exercises in WeBWorK and in MyLab Math.

Calculators: Only calculators approved by the Department (with a sticker attached as proof of approval), are permitted for the class test and final examination. For the list of Approved calculators see www.concordia.ca/artsci/math-stats/services.html.

Reading Week: No classes between October 11 and October 17, 2025.

Midterm Test: There will be **one midterm test**, based on the material of weeks 1-6 (as listed in the course CONTENTS below), which will contribute up to 30% to your grade (see the **Grading Scheme**).). The test will be common for all sections of the course and will start **at 10:00 A.M** on **Sunday, 26 October 2025,** and will be 1.5 hour long. The rooms for the test will be announced one week before the test.

Students who are unable to write the midterm test for a valid reason must inform their instructor in advance to request a 90% final exam option for their grade (*see the NOTE below*). Such a request **will not** be granted unless it is made in writing by email, the reason accepted as valid and supported by appropriate letter or other documentation. **Valid reasons** for missing the midterm test include time conflicts (coinciding exam times) with other exams, religious observances (must be reported to the instructor ***in advance***), illness (to be reported as soon as possible and supported by a valid medical note), a scheduled academic or athletic event (the student must be an active member of the team, to be supported by a letter from the coach). Students who miss the midterm test but were not approved for "90% final exam + 10% assignments" option as described above will not be granted it and will forfeit the marks for the midterm test.

N.B.: Travel arrangements are **not** considered a valid reason for missing the test.

NOTE: If you are taking another course with a common midterm test at the same time (NOT just the day) as this one, you may choose which of the two tests you want to write. If you are choosing to write the midterm for this course, you must then inform the instructor of the other course that you will not write their midterm because of the time conflict. If the midterm to be missed is from a MATH 200-MATH 209 course, then the "90% final +10% assignments" scheme will be applied to calculate your grade for that other MATH course.

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, time, **and location** of the final exams once the schedule is posted by the Examinations Office. Problems with the scheduling of the final exam must be reported to **the Examinations Office, not to your instructor**.

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

a) 10% for the assignments, 30% for the midterm test, 60% for the final exam.
b) 10% for the assignments, 10% for the midterm test, 80% for the final exam.

NOTE: Because the midterm test in option (A) contributes as high as 30% to your grade, the "Short-Term Absence form" **cannot be used as a justification for missing the midterm test** for either grading option.

CONTENTS

Note: All of Chapter 1 is a brief review of material that is covered in prerequisite courses, and is important for this course. If you don't know this preliminary material thoroughly, or if you would feel you don't know it well enough after the first couple of classes, you may want to consider dropping the course and choose MATH 201 first instead of MATH 203.

Lectures	Topics			Recommended Problems
1	1.2	Combining Functions; Shifting & Scaling Graphs	p.18:	1, 3, 5, 7, 9, 15, 17, 19, 21, 23, 25
	1.3	Trigonometric Functions	p.27:	7, 9, 11, 15, 19, 25, 29, 37, 47, 49
	1.5	Exponential Functions	p.37:	3, 7, 9, 11, 13, 15, 21, 25, 27, 33
2	1.6	Inverse Functions and Logarithms	p.49:	9, 17, 21, 29, 31, 41, 47, 53, 63, 71
	2.1	Rates of change and Tangent Lines	p.61:	1, 3, 5, 23, 25
3	2.2	Limit of a Function and Limit Laws	p.71:	3, 5, 13, 15, 19, 25, 27, 37, 55, 65
	2.4	One-Sided Limits	p.88:	3, 7, 9, 15, 17, 19, 33, 37
	2.6	Limits Involving Infinity; Asymptotes	p.112:	1, 9, 11, 21, 27, 35, 41, 71, 87, 89
4	2.5	Continuity	p.100:	5, 13, 19, 29, 31, 41, 45, 49, 61
	3.1	Tangent Lines and the Derivatives	p.123:	5, 11, 17, 21, 25, 31, 33
	3.2	The Derivative as a Function	p.130:	3, 9, 11, 17, 23, 25, 55, 59
5	3.3	Differentiation rules	p.142:	5, 7, 11, 15, 21, 23, 29, 43, 47, 61
	3.5	Derivatives of Trigonometric Functions	p.158:	3, 7, 11, 13, 19, 23, 31, 37
6	3.6	The Chain Rule	p.166:	5, 7, 13, 21, 23, 31, 35, 37,45, 63, 77
	3.7	Implicit differentiation	p.172:	1, 5, 11, 15, 25, 27, 37, 39, 41
7	3.8	Derivatives of Inverse Functions, Logs	p.183:	7, 11, 27, 31, 33, 37, 39, 53, 89, 95
	3.9	Inverse Trigonometric Functions (start with the review of arcsin & arccos, § 1.6)	p.189:	5, 9, 11, 17, 25, 29, 39, 43, 45
8	3.10	Related rates	p.196:	7, 11, 13, 15, 17, 21, 23, 27, 33, 39
	3.11	Linearization and Differentials	p.209:	5, 11, 17, 19, 23, 33, 39, 45, 49, 59

9	4.5	Indeterminate forms, L'Hôpital's Rule	p.262:	9, 11, 15, 17, 21, 43, 47, 53, 61, 63
	4.1	Extreme Values of Functions	p.227:	5, 17, 23, 31, 37, 39, 53, 63, 69, 89
10	4.3	Monotonic Functions	p.241:	5, 7, 19, 27, 29, 54, 57, 61
	4.4	Concavity and Curve Sketching	p.251:	5, 9, 13, 17, 31, 37, 43, 81, 85, 99
11	4.6	Applied Optimization	p.269:	3, 5, 7, 9, 11, 13, 15, 19, 29, 37, 41
12		**REVIEW**		

Student Services
You may wish to access the many services available to you as a Concordia student. An overview of these resources can be found here: https://www.concordia.ca/students/services.html

Academic Integrity and the Academic Code of Conduct
This course is governed by Concordia University's policies on Academic Integrity and the Academic Code of Conduct as set forth in the Undergraduate Calendar and the Graduate Calendar. Students are expected to familiarize themselves with these policies and conduct themselves accordingly. "Concordia University has several resources available to students to better understand and uphold academic integrity. Concordia's website on academic integrity can be found at the following address, which also includes links to each Faculty and the School of Graduate Studies: https://www.concordia.ca/conduct/academic-integrity.html" *[Undergraduate Calendar, Sec 17.10.2]*

Behavior
All individuals participating in courses are expected to be professional and constructive throughout the course, including in their communications.

Concordia students are subject to the Code of Rights and Responsibilities which applies both when students are physically and virtually engaged in any University activity, including classes, seminars, meetings, etc. Students engaged in University activities must respect this Code when engaging with any members of the Concordia community, including faculty, staff, and students, whether such interactions are verbal or in writing, face to face or online/virtual. Failing to comply with the Code may result in charges and sanctions, as outlined in the Code.

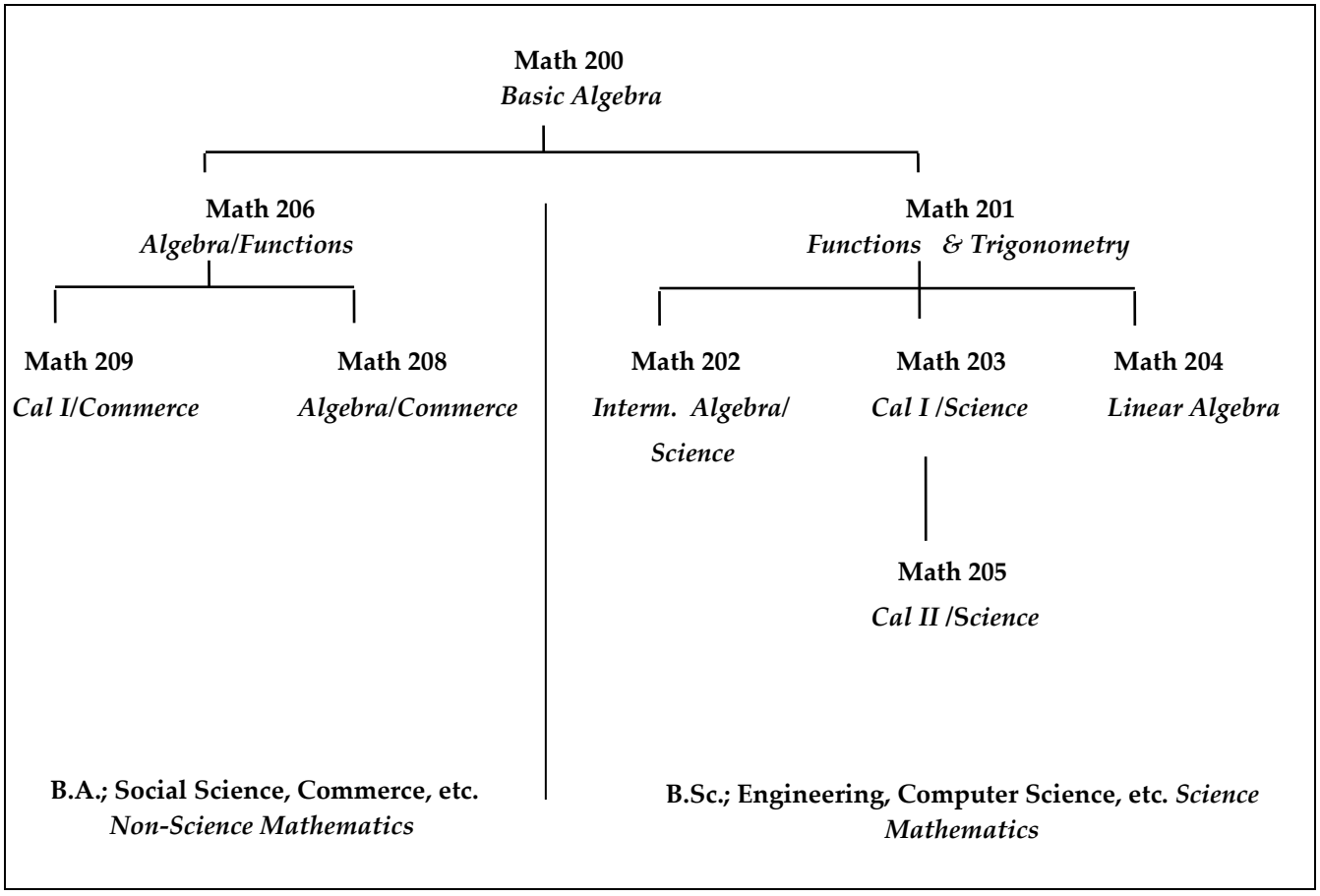
Intellectual Property
Content belonging to instructors shared in online courses, including, but not limited to, online lectures, course notes, and video recordings of classes remain the intellectual property of the faculty member. It may not be distributed, published or broadcast, in whole or in part, without the express permission of the faculty member. Students are also forbidden to use their own means of recording any elements of an online class or lecture without express permission of the instructor. Any unauthorized sharing of course content may constitute a breach of the Academic Code of Conduct and/or the Code of Rights and Responsibilities. As specified in the Policy on Intellectual Property, the University does not claim any ownership of or interest in any student IP. All university members retain copyright over their work.

Extraordinary circumstances
In the event of extraordinary circumstances and pursuant to the Academic Regulations the University may modify the delivery, content, structure, forum, location and/or evaluation scheme. In the event of such extraordinary circumstances, students will be informed of the change.

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.

Help: The Math Department runs a drop-in **Math Help Centre** in **LB 912** - call the Department's office for further information at 848-2424, Ext. 3222/3223.

Scoring: 10 or less = Math 201 is highly recommended; 11-14 = see an advisor; 15 or better = Math 203.

MATH 203
Qualifying Test
(***Answers are on the last page***)

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

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

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 $\ominus 4x + 5y = \ominus 10$ 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) $x = \ominus 6$ b) $x = \ominus 1$ c) $y = \ominus 6$
d) $y = \ominus 1$ 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 $x^2 \ominus 10kx + R$ 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) $\log A + \frac{1}{2}(\log B \circledcirc \log C)$ 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)