

HANDOUT FOR INTERNET MATH1950 Calculus I

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1. Introduction

This course is Calculus I, MATH1950. It is different from the on campus courses in that it is offered as an internet course. The exams (on campus, proctored) are taken on the computer and are graded by Maple. Maple is a computer algebra software package and is able to do an amazing amount of mathematics. You may already have experience with it.

Taking the course by internet allows you to work at your own pace to some extent. There is a time table for tests (more on exams later). It also means that you will need a great deal of self discipline so that you keep up with your study of MATH1950 on a daily basis. To facilitate this process there will be weekly quizzes. You are exchanging the requirement to attend class 5 days a week, at a specified time, for the freedom to set your own schedule of study, subject to the course deadlines.

Practice tests will be placed on the class website so that you will be able to become familiar with the required syntax for entering mathematical solutions (more on this later) into the computer. Practice tests will also be given for each of the Exams. The questions are not necessarily the same as the ones that will appear on the exams. They will however contain very nearly the same number of questions and will be selected from the sections that are to be covered on the exam.

Two types of homework assignments are made. There is a set of 5 homework assignments that are turned in for grading. These are tied to the semester exams. Other homework assignments (ungraded) will be given for each section covered in the text. The answers to the questions, in the text, are given in the back of the book. They represent the most important concepts which need to be understood by the student, and in particular, all concepts to be covered on the exams. Students are encouraged to ask questions about any problems not understood during my office hours.

You will have two accounts related to this course. They are:

Blackboard Account

This site will allow you to communicate with the other students and with me. It will also allow for interactive help sessions on the computer. I will also be posting the course syllabus, exam schedules and other important information on this site. You need to log into it regularly and check the contents. **See section 7 for further information.**

Mathematics Department Maple TA Account

This is the account that you will log into to take the exams and quizzes.

Email communication

Email communication will be through the universities email system **only**.

2. Calculators

You will need a calculator that is capable of doing standard mathematical computations. That is addition, subtraction, multiplication, division and evaluation of exponentials, logarithms, and the trig functions and their inverses as well as the hyperbolic functions. You will NOT be allowed to use a high end calculator, that is a calculator that is programmable and/or can compute derivatives and integrals or a calculator that has graphing capabilities.

EXAMPLES OF ACCEPTABLE SCIENTIFIC CALCULATORS

This not an exhaustive list of scientific calculators, but only a very short list of what is available at this time. All of the ones listed are considerably cheaper than the general class of graphing calculators. The prices are for illustration only and may not be current.

Texas Instruments TI-36X (\$20.99).

Texas Instruments TI-30X IIS (\$16.99).

Hewlett Packard hp 30 S (\$16.99).

Hewlett Packard hp 9 S (\$11.99).

Sharp EL 531WB-BK (\$9.99).

EXAMPLES OF UNACCEPTABLE SCIENTIFIC CALCULATORS

Unacceptable calculators fall into the general classification of graphing calculators. A short, but not exhaustive, representative list would be:

Texas Instruments TI-83 PLUS.

Texas Instruments TI-84 PLUS.

Texas Instruments TI-89 Titanium.

Hewlett Packard hp 39 g+.

Hewlett Packard hp 48 g II.

Before coming to an examination you should make sure that you are completely familiar with how to operate your scientific calculator so that you will not be hampered by having to fumble around with your calculator. You will need to bring your scientific calculator to every test as some of the numbers in the problems can become large. Also some of the numbers will need to be rounded to a specified number of decimal places.

3. Examinations

Format for Exams and Quizzes

All exams and quizzes are open book and open notes.

Exam Days of the Week

Right now the exams are all scheduled for Monday through Friday at various times. See the current exam schedule on blackboard. If there is sufficient interest Saturday hours might be added. Please send me an email indicating if Saturday exam dates would be of benefit to you.

There will be five semester exams along with a final exam. The first five exams will be approximately 1-1.15 hours in length. The final exam will be 2 hours long. **All of these exams are proctored and will be taken in the mathematics department facilities located in room DSC213.** This system displays the exams one question at a time. After you enter your answer the computer corrects your response and displays the next question. Your answer to each question will be typed into the space provided for it on the question display. You will enter it using the required syntax (more on this later). Before submitting your answer you can use the **preview** key to check your syntax. After hitting the preview key, Maple will translate your answer into standard mathematical symbolism, that is what you see in your calculus textbook. If it is what you want you can submit it for grading, if not you may make corrections to it.

Your answer will be graded by Maple and your grade will be 100% right or 0% right. In other words there will be no partial credit. Because of this the following policy will be implemented. The normal score on an exam is 100, and because of the all or nothing Maple grading, one or more bonus questions will be added to the exam to make it worth 110 or more. Thus you will be allowed to miss at least one problem and still get 100% on the exam.

There will be weekly (unproctored) computer graded Quizzes which you can take from home. You will have a limited amount of time, in days, to take the quizzes. The quizzes will start in week one and continue through the 14th week of classes. The exam and quiz dates are given in a separate document. I will average the highest 9 quizzes together to a grade between 0 and 100.

There will be 5 homework assignments that are to be graded (see the document MATH1950_course_homework) and other homework problems that are not graded. Each graded assignment is worth 110 points which includes 10 bonus points.

The grading scheme for the course will be the following:

EXAM	MAXIMUM NUMBER OF POINTS
5 semester exams, in which the lowest is dropped	≥ 400
Quiz average	≥ 100
5 Graded homework assignments	≥ 100
End of semester final exam	≥ 200
	TOTAL ≥ 800
Final Numerical Score	TOTAL/8.

Your final numerical score will be in the range $0 \leq \text{final score} \leq 100+$. If you have consistently earned bonus points, that is test scores ≥ 100 then your Final Numerical Score may well be greater than 100. After your Final Numerical Score is computed you will be given a grade based on the following scale.

97 - 100+	A+ (100+ accounts for possible bonus points)
93 - 97	A
90 - 93	A-
87 - 90	B+
83 - 87	B
80 - 83	B-
75 - 80	C+
70 - 75	C
65 - 70	C-
62 - 65	D+
58 - 62	D
55 - 58	D-
0 - 55	F

The course instructor can modify the result of any exam by scaling the scores if he or she deems this should be done. The same applies to the Final Numerical Score. The above scale then can be looked at as a guarantee. If your final average is 95.6 then you will be absolutely sure of getting at least an A even if there is a scaling of the grades.

The exam and Quiz schedule for the semester is posted on the class blackboard account. The 5 semester exams can be taken during the times scheduled for that exam. If the exam is missed it can be made up (a different exam will be given than was used during the scheduled time) for a very limited period of time. The details are given in the examination schedule. No makeup exams outside of the specified times will be allowed. If you miss the specified makeup window a grade of zero will be recorded for that particular exam. The final exam will be scheduled and at the end of the scheduled time for it, your grade will be computed and submitted to the university. Any adjustments after this time will have to be done through the means of a change of grade process.

Drop Date

The drop date for each semester is given on the universities web site. It is found under the semester calendar. If you feel that you must drop the course, then you should, by all means, drop before the official drop date. This will give you a W for a course grade.

Incompletes

Incompletes can possibly be given under certain conditions. To see the latest policy log on to the UNO website www.unomaha.edu/main.php and search for undergraduate catalog. After you access the catalog do a search for **incompletes**. This should bring up the section of the catalog where incompletes are discussed.

4. Syntax for Entering Mathematical Solutions

In the rectangular box where your answer goes you will see one of two things. One is **this question accepts numbers or formulas** or the other possibility is **this question accepts Maple syntax**. Thus we have two types of syntax to discuss. Fortunately the difference between them is not great.

This question accepts numbers and formulas

Our problem is how to correctly enter **formulas**. What is given here is, for the most part, what is used in Maple. There are other possibilities which you can investigate in the help menus, our intention here is to make things as simple as possible. We use +, -, * for multiplication and / for division. For exponentiation we use ^. Thus the formula

$$\frac{5x + 3 + \sqrt[3]{2x^2 + 10}}{3x - 5}$$

would be entered as $(5*x+3+(2*x^2+10)^(1/3))/(3*x-5)$. Note that we use * for multiplication and ^ for exponentiation. If the exponent is anything other than a positive real number then enclose the exponent in a set of parenthesis. Unless you are entering a simple numerical fraction it is best to enclose the numerator in a set of parenthesis and also the denominator in a separate set of parenthesis. For another example consider

$$(3x - 5) \sin(6x) \tan(2x) + \arctan(5x^2 + 7) \ln(8x + 5).$$

This would be entered as $(3*x-5)*\sin(6*x)*\tan(2*x)+\arctan(5*x^2+7)*\ln(8*x+5)$. Additionally consider

$$18e^{3x+4} + (6x - 7) \ln(3x^2 + 2x - 5)$$

we would enter this as $18*e^(3*x+4)+(6*x-7)*\ln(3*x^2+2*x-5)$. There are several things to note:

- The exponent of e is enclosed in parenthesis to avoid any possible confusion.
- The multiplication symbol * is used to indicate multiplication by numbers, symbols, or expressions.
- The standard mathematical e and ln are used.

This method of entering formulas is **almost** compatible with Maple syntax and so we use it to cut down on the memory work. There are other alternatives for entering formulas. If you desire to do so you can refer to the help menu.

This question accepts Maple Syntax

Our problem is how to correctly enter **maple syntax**. What is given here is exactly what is used in Maple. We use +, -, * for multiplication and / for division. For exponentiation we use ^. Thus the formula

$$\frac{5x + 3 + \sqrt[3]{2x^2 + 10}}{3x - 5}$$

would be entered as $(5*x+3+(2*x^2+10)^(1/3))/(3*x-5)$. Note that we use * for multiplication and ^ for exponentiation. If the exponent is anything other than a positive real number then enclose the exponent in a set of parenthesis. Unless you are entering a simple numerical fraction it is best to enclose the numerator in a set of parenthesis and

also the denominator in a separate set of parenthesis. Note that this identical to the case for **formulas**. For another example consider

$$(3x - 5) \sin(6x) \tan(2x) + \arctan(5x^2 + 7) \ln(8x + 5) .$$

This would be entered as $(3*x-5)*\sin(6*x)*\tan(2*x)+\arctan(5*x^2+7)*\ln(8*x+5)$. Again this is the same as for the formulas case. Additionally consider

$$18e^{3x+4} + (6x - 7) \ln(3x^2 + 2x - 5)$$

we would enter this as $18*\exp(3*x+4)+(6*x-7)*\ln(3*x^2+2*x-5)$. There are several things to note:

- Instead of e we use exp().
- The multiplication symbol is used to indicate multiplication by numbers, symbols, or expressions.
- The standard mathematical ln is used. The table below gives the syntax for the two systems.

Sets, lists

Item	Numbers & Formulas	Maple Syntax
∞	infinity	infinity
e^x	e^x	exp(x)
π	pi	Pi
Square root	sqrt	sqrt
Natural log	ln	ln
Log base 10	ln(x)/ln(10)	log10
Absolute value	abs	abs
Sine	sin	sin
Cosine	cos	cos
Tangent	tan	tan
Secant	sec	sec
Cosecant	csc	csc
Cotangent	cot	cot
Inverse sine	arcsin	arcsin
Inverse cosine	arccos	arccos
Inverse tangent	arctan	arctan
Inverse secant	arcsec	arcsec
Inverse cosecant	arccsc	arccsc
Inverse cotangent	arccot	arccot
Hyperbolic sine		sinh
Hyperbolic cosine		cosh
Hyperbolic tangent		tanh
Hyperbolic secant		sech
Hyperbolic cosecant		csch

Hyperbolic cotangent		coth
Inverse hyperbolic sine		arcsinh
Inverse hyperbolic cosine		arccosh
Inverse hyperbolic tangent		arctanh
Inverse hyperbolic secant		arcsech
Inverse hyperbolic cosecant		arcsch
Inverse hyperbolic cotangent		arccoth

5. Entering Solutions to Questions

Algorithm for entering your answer

- 1). Determine the correct mathematical solution to the problem. Is the question calling for the answer to be put into a certain format? If so, be sure to use the required format.
- 2). Check to see which syntax is being called for, numbers & formulas or Maple syntax.
- 3). Type in your answer using the syntax called for by the question and do not add any uncalled for punctuation marks or units. **BE CAREFUL THAT YOU SUBMIT YOUR ANSWER ONLY AFTER IT HAS BEEN CHECKED IN THE PREVIEW SCREEN.**
- 4). Use the **preview** button to check your typing before entering your answer.
- 5). NEVER add units, such as feet, pounds, etc., to your answer.
- 6). Remember once you submit your answer for grading it cannot be called back.

Simplification of Answers

Some simplification steps can be skipped. This is a vast topic and only hints can be given here. Here are some examples of not carrying out simplification steps.

Example 1

Enter the second degree polynomial that has the 2 roots $x = 1, -5$.

Answer 1

$$(x-1)*(x+5)$$

Note that the answer is mathematically correct. It was not necessary to actually multiply the terms out and write the answer as $x^2 + 4x - 5$.

Example 2

Find the first derivative of $y = \frac{ax+b}{cx+d}$.

Answer 2

$$\frac{dy}{dx} = \frac{a(cx+d) - c(ax+b)}{(cx+d)^2} = (a*(c*x+d) - c*(a*x+b))/(c*x+d)^2$$

Again we did not multiply out all of the terms and simplify further. It is important to note that the given solution is mathematically correct. You will learn about derivatives in the course.

Example 3

Find the derivative of $y = (2x^3 + 4x^2)(5x + 7)$.

Answer 3

$$\frac{dy}{dx} = (6 * x^2 + 8 * x) * (5 * x + 7) + (2 * x^3 + 4 * x^2) * 5.$$

Here, once again, the given solution is mathematically correct. We simply did not simplify the result as much as possible.

Clearly no hard and fast rules can be given other than do not do any unnecessary simplification.

6. Computer Crashes and other technical difficulties.

If your internet connection fails while you are doing a practice test or using the practice syntax files then, you may use the computers on the UNO campus in the DSC user room. It is located in the Durham Science Center Room 104.

7. Computer Accounts

You will be logging into to different accounts. One login will get you to blackboard. This will allow you to contact other students by email. It will also allow you to access any important messages that I need to transmit to you. You can access blackboard by going to <http://myuno.unomaha.edu/webapps/portal/frameset.jsp>. Once there your username is your university email name and your password is your university email password.. Use these to log in. You should then be able to locate this course on your web page. Click on it to enter into the web site for this course.

The other account is located in the mathematics department. On it resides the syntax practice examples, practice tests, Quizzes and exams for this course. The syllabus can be found on the class blackboard site.

8. Browser Difficulties.

There have been some difficulties in using the Microsoft Internet Explorer, particularly off campus, when logged onto the Maple TA account. To solve this you may wish to download and use the Firefox web browser. As a registered student you can download it from the web site <http://install.unomaha.edu> . This browser seems to work much better with the Maple TA server.

9. Help Sessions

I will hold regularly scheduled office hours in DSC230. The exact schedule will be posted on blackboard before the semester begins. You should feel free to come in and see

me during these times for help on the course material, problems or difficulties that you may be experiencing with the course.

The math and physics departments will be hosting a joint tutor room in DSC. I will post the schedule, on blackboard, as soon as it becomes available.

10. email communication

My email address is jmaloney@mail.unomaha.edu . I will not answer questions that seek help with mathematical problems related to this course. These will be handled in one or more of the help sessions. Please confine your email requests to problems that are not handled by the scheduled help sessions. On Monday through Friday I will do my best to respond within 48 hours. **Email communication is exclusively through the universities email system.**

11. Examination Schedule

Please see the separate document on examinations and Quizzes that is posted on blackboard.

12. Homework

Two types of homework assignments are made. There is a set of 5 homework assignments that are turned in for grading. These are tied to the semester exams. Other homework assignments (ungraded) will be given for each section covered in the text. The answers to the questions, in the text, are given in the back of the book. They represent the most important concepts which need to be understood by the student, and in particular, nearly all concepts to be covered on the exams. Students are encouraged to ask questions about any problems not understood during my office hours.