

COURSE OUTLINE:

CALCULUS — Early Transcendental Single variable (Math-139)

Prof. Jian-Jun Xu

“McGill University values academic integrity. Therefore, all students must understand the meaning and consequences of cheating, plagiarism, and other academic offenses under the Code of Student Conduct and Disciplinary Procedures (see www.mcgill.ca/integrity for more information).”

1. SYLLABUS

Chapter 0: A Preview of Calculus.: This is motivational material, and may not all be discussed in the lectures. Read it.

Chapter 1: Functions and Models.: In §1.1, two of the four ways to define a function are not useful in general: a table of values can be used to define a function only if its domain is finite, and the value of the function is prescribed for every point in the domain; it is normally not acceptable to define a function by a graph, unless the nature of the graph can be described without any ambiguity. §1.2 may not be discussed in the lectures, but you should *read* it — in particular the definitions of various kinds of functions — as this terminology may be used from time to time.

You are expected to understand the *Principle of Mathematical Induction*, which will be required in proving theorems and solving problems that involve the positive integers (=“the natural numbers”).

Chapter 2: Limits and Derivatives.: §2.4 will be discussed in the lectures, but will not be examination material; read it! The subsection of §2.6 called “Precise Definitions” should also be read, but will not be examination material.

Chapter 3: Differentiation Rules.: Omit §3.3; but you are encouraged to read the parts of §3.3 that pertain to your own fields of interest.

Chapter 4: Applications of Differentiation.: In §4.5 you may skip the discussion of “slant asymptotes”. Omit §4.6, §4.8, §4.9.

2. COURSE MATERIALS

2.1. Required Text-Book. The textbook for the course is J. Stewart, *Single Variable Calculus: Early Transcendental, Fifth Edition*, Brooks/Cole (2003), ISBN 0-534-39330-6. This book is the first half of J. Stewart, *CALCULUS: Early Transcendental, Fifth Edition*, Brooks/Cole (2003), ISBN 0-534-39321-7; this edition covers the material for Calculus III (MATH 222) as well, but is not the text-book for that course at the present time.

2.2. Optional Reference Books. It is recommended that students make use of the student solution manual:

- D. Anderson, J. A. Cole, D. Drucker, *STUDENT SOLUTIONS MANUAL FOR STEWART’S SINGLE VARIABLE CALCULUS: Early Transcendental (5e)* Brooks/Cole (2003), ISBN 0-534-39333-0. This book is also sold “bundled” with either version of the text book; the bundles are numbered ISBN 0-534-42976-9 and ISBN 0-534-10307-3.

The publishers of the textbook and Solutions Manual also produce

#	Day	Begins	Ends	Room	Tutor	E-mail
T002	Th.	08:05	09:55	BH.1214	Li, Qun	qunli@math.mcgill.ca
T003	Th.	16:05	17:55	BH. 1B36	Lepage Thomas	lepage@math.mcgill.ca

TABLE 1. Schedule and Locations of Tutorials (subject to change)

- a “Study Guide”, designed to provide additional help for students who believe they require it: R. St. Andre, STUDY GUIDE FOR STEWART’S SINGLE VARIABLE CALCULUS: EARLY TRANSCENDENTAL, FIFTH EDITION, Brooks/Cole (2003), ISBN 0-534-39331-4. (The “Study Guide” resembles the Student Solution Manual in appearance: be sure you know what you are buying.)
- a “Companion” which integrates a review of pre-calculus concepts with the contents of Math 140, including exercises with solutions: D. Ebersole, D. Schattschneider, A. Sevilla, K. Somers, A COMPANION TO CALCULUS. Brooks/Cole (1995), ISBN 0-534-26592-8.

3. TUTORIALS; TUTORS’ COORDINATES

Every student must be registered in *tutorial* session as well as lecture session for this course. Tutorials begin in the week of September 11, 2006. Table 1 below gives times, locations, and the tutor’s name for the tutorials.

Individualized written assignments W_1, W_2, W_3, W_4, W_5 will be mounted on the Web-site about a week before they are to be handed in at the tutorial sessions. You should download or copy each written assignment from the web site, write out your solutions at home, bring the **completed** assignment with you to the tutorial.

4. PRELIMINARY TIMETABLE FOR LECTURE OF MATH 139; 2006/01

Distribution Date: September 3rd, 2004
(All information is subject to change.)

MONDAY		WEDNESDAY		FRIDAY	
SEPTEMBER					
	6	First Lecture	8	§1.1; §1.2	
Tutorials begin the week of September 11 Use Textbook Appendices A, B, C, D to review prerequisites!					
11	§1.3; Omit §1.4		13	§1.5, §1.6	
18	§2.1, §2.2		20	§2.2	
Deadline for withdrawal: September 19					
25	§2.4		27	§2.5 R_1	
29			29	§2.5, §2.6	
OCTOBER					
2	§2.6, §2.7		4	§2.7, §2.8 R_2	
9	§3.1		11	§3.2 R_3	
16	§3.3, §3.4		18	§3.4 R_4	
23	§3.6		25	§3.7 R_5	
27			27	Mid-term Test	

MONDAY	WEDNESDAY	FRIDAY
NOVEMBER		
	1 §3.8	3 §3.9 R_6
6 §3.9, §3.10	8 §3.11	10 X R_7
13 §4.1	15 §4.1	17 §4.2 R_8
20 §4.3	22 §4.4	24 §4.5 R_9 (Omit “slant asymptotes”)
27 §4.7	29 §4.7	
DECEMBER		
		1 §4.10 R_{10}
4 §4.10 (Last lecture)		

Notation: R_n = Regular WebWoRK Assignment # R_n due at midnight on Monday this week

W_n = Written Assignment handed in tutorial

X = reserved for expansion or review

(Section numbers refer to the text-book.)

5. MARKING SYSTEM

- (1) Regular WebWoRKs (R): $R_1 - R_{10}$;
- (2) Written Assignments (W): $W_1 - W_5$;
- (3) Mid-term test (M);
- (4) Final exam (F);

$$\text{The Final Mark} = \max \left\{ \begin{array}{l} 0.1 * (W) + 0.1 * (R) + 0.3 * (M) + 0.5(F), \\ 0.1 * (W) + 0.1 * (R) + 0.8 * (F). \end{array} \right\}$$

6. ABOUT THE WEBWORK ASSIGNMENTS

The WebWoRK assignments for this course will be available on the Web and will be answered on the Web. We will be using the **WeBWorK system** developed by Prof. Arnie Pizer and Prof. Mike Gage at the University of Rochester.

(visit website: “<http://webwork.math.rochester.edu/docs/>”)

WeBWorK is an internet based method for delivering homework problems to students over the internet. In case it is impossible to deliver WeBWorK assignments for logistical reasons, your instructor reserves the right to deliver assignments by more traditional means.

6.1. What do I need to use WeBWorK. The ideal is to have your own computer. Typically it is desirable to have:

- An internet connection.
- An internet browser, Netscape, Microsoft Internet Explorer, etc..
- Adobe’s Acrobat Reader.
- A printer.

If you do not have a personal computer or you do not have all the components listed above, first try to obtain an account at a computer lab on campus. If you are a Faculty of Science student, you can get an infopoint account through the SUS. If you are a Faculty of Arts student you are entitled to an account in

the Faculty of Arts Computer Lab (FACL), located in the Leacock building, room 110. In the last resort, we will arrange for an account in a computer lab on campus, come see me at my office - BURN 1247.

6.2. How do I use WeBWork? Here are the basic steps on how to get started.

Most pages of *WeBWork* also contain directions. Therefore, if you are ever unsure of what you should do, try reading the directions and descriptions on the page at which you are looking.

- (1) Find a computer with access to Netscape, Microsoft Internet Explorer etc.
- (2) Open the browser and go to the *WeBWork*

“<http://msr02.math.mcgill.ca/webwork/m139f06>”
login page for MATH139, Fall 2006.

This will get you to the main page of your course. This page includes necessary information about logging in.

- (3) To log in, click on the ‘Login’ button. This will take you to a login page. Enter your login name and password, and click on the ‘Continue’ button.

Usually, your **login name** is your 9 digit McGill student ID number. Your initial **password** is also your 9 digit McGill student ID number.

- If your login is incorrect, you will be told so, and you can return to the login page and try again. If you are persistently unable to log in, see your professor.
- If your login is correct you will see a page where you can do following:
 - : Change your password. Please do this the first time that you log in. This is important since your initial password may be available to others. For your own protection you should change your password at least by the time that Set 1 opens. (Set1 is the first problem set that is for credit). Keep a record of your password. Once changed, your instructor does not have access to it.
 - : change your e-mail address if necessary. Please do this the first time that you log in. Your e-mail address is initially set to your McGill PO-Box account given to every student on registration. If you do not use this account on a regular basis, change the e-mail address to the account that you prefer. This will enable us to send you course related information electronically.
 - : Log out.
 - : Begin problem sets. Following this link, you reach a page where you can:
 - (a) Look at and do the problems in a set via your browser. To do Set 1, for example, click on the line in the box that starts with ‘Set 1...’. Then click on the ‘Do problem set’ button. On each line in the box, where all the sets are listed, after the set number, you can see whether the set is open or closed. If the set is open, that means that when you solve a problem, the result will be recorded in the course database. If the set is closed, you can still solve problems, but your results will not be recorded. After the indication of whether the set is open or closed, there is additional information about the due date (if the set is open), or whether the answers are available (if the set is closed). When the answers are available, you have the option of looking at correct answers when viewing a problem.
 - (b) Get a printout of the problem set. To print out Set 1, for example, first choose the download type - PostScript or PDF. After choosing one of the download types, click on the line in the box that starts with ‘Set 1...’. Then click on the ‘Get hard copy’ button. Probably best to use the PDF format because it is universal. Acrobat Reader is available (free of charge from Adobe) for virtually every computer platform and will print to virtually every type of printer. However, PostScript format may give better results. To read the PDF files you need Adobe’s

Acrobat Reader (version 3.0 or better), however in order to see some mathematical symbols (notably square roots) correctly you will need version 4.0 or better. If you use the PDF plug-in in your browser it is best to have version 5.0 or better. This allows you to save directly from the plug-in. Just click on the disk icon in the toolbar. If you are not using a plug-in, you will most probably get a dialog box to enable you to save the file. Note that you can use the preferences command of your web browser to configure your browser to automatically transfer PDF files and/or postscript files to the appropriate application for viewing and printing. To print a PostScript file, you will need a PostScript capable printer or a PostScript interpreter such as GSview for Windows or MacGhostView for the Macintosh. Most laser printers such as those found in computer labs are PostScript capable and most inkjet printers are not PostScript capable. If you don't have a printer, you might want to go to a university computer lab and print out the current homework set there. You only need to print out a problem set once. From then on, you can enter the answers over the web on your own computer.

(c) Look at a summary of your WeBWorK homework scores. This is the second section of the page. If you click on the button 'Get Summary', you will see your current scores for all available problem sets.

(d) If you are printing out a problem set or looking at a summary of your homework scores, you are done. If you are viewing a problem set, you will see a page with the problems in the set you chose. To view and/or answer a problem, click on the number of the problem and click on the 'Get Problem' button. Notice that there are four modes of viewing the problem: 'text', 'formatted-text', 'typeset' and 'typeset2'. The 'typeset2' mode is new (to version 1.8 of WeBWorK) and a big improvement on the other modes. It is both more readable and substantially faster than 'typeset'. We recommend that you use 'typeset2' exclusively. Once you choose a problem and click on the 'Get Problem' button, you will see the text of the problem with boxes for your answers. If you wish to submit a solution at this time, enter your answer(s) and click on the 'Submit Answer' button. Once you have submitted an answer, you will be told whether your answer is correct or not. If not, you may be able to try again. The instructor sets the maximum number of available tries for each problem. This may be a finite number of tries or it may be unlimited. After you have tried a problem, you can either go to the next problem, the previous problem, or see the list of the problems again. If you are working on a problem set that is already closed, you will have the option to see the correct answer. To see the correct answer, just check the box(es) and click on the 'Submit Answer' button (you do not have to enter an answer to see the correct answer).

(e) If you want to check the status of your problems (e.g. to double check that your answers have been recorded), use the 'Prob. List' button at the top of the page to see the problem list page.

(f) When you are finished, log out using the 'Logout' button at the bottom of the page. This may be very important if you are working close to the deadline for completing the assignment. If you close your browser without logging off, it will be at least half an hour before you will be able to log on again.

6.3. Things to know.

- (1) If you have a problem logging in, contact your instructor.

- (2) If you have questions on specific homework problems or if you have comments about *WeBWorK* that you think can help us make *WeBWorK* better, click on the ‘Feedback’ button on any of the pages of *WeBWorK*
- (3) If you are logged on to *WeBWorK* for longer than 30 minutes without any activity, you will be asked to log in again. This is a security measure. You can resume your work after you logged back in. All your results from the last log in will be saved.
- (4) Each *WeBWorK* problem set is individualized (each student has a different version of each problem, for example the numerical values in the formulas may be slightly different). In some problems, versions may differ in more substantial ways.
- (5) Working close to the submission deadline may be risky, the server will be heavily used at that time and probably rather slow. Much better to submit your solutions a day or two in advance of the deadline.
- (6) There is a problem set on the server designated SetGentle which is not for credit and exists to help you get a feel for the way that the *WeBWorK* system works.
- (7) On the computer screen the problems, with spaces for the answers, are displayed in typeset format as a web fill-in form. Since *WeBWorK* uses standard HTML syntax it is possible to display graphs using the standard “png”; format. Even typeset mathematics can be displayed on the screen using png’s (portable network graphics). Very old browsers may not support the “png” format. In this case use typeset mode or formatted text mode. This will work for typeset mathematics, but not for displayed graphs.
- (8) The *WeBWorK* system is quite flexible. For example, if a problem has several parts the professor has the choice of informing students whether answers for the separate parts are correct or not. Typically, if a problem involves parts with numerical answers, the professor will have *WeBWorK* inform the student which parts he or she have done correctly but would not do this for a multiple choice question or a question with multiple True/False parts. Similarly, the professor has flexibility in how he or she grades an assignment.
- (9) Be aware of the number of available tries for each question you attempt. You can tell if there is a limit on the number of tries by scrolling down to the ‘submit answer’ button. Alongside this button you will see the number of tries that remain. This message is not present if the number of tries is unlimited.
- (10) If the number of tries is limited, be sure to answer ALL parts of a multipart question before clicking the ‘Submit Answer’ button. Every time you click this button counts as an attempt at answering the question even if all the fields are not filled in. On the other hand, if the number of tries is unlimited and the question is set up to show partially correct answers, it may make sense to answer each part of the question separately and check your answers as you go.
- (11) Avoid hitting the ‘return’ key until you are ready to submit your answer. In most browsers, hitting the ‘return’ key is the same as clicking the ‘default’ button; in Webwork’s case, this is the ‘Submit Answer’; button. To navigate quickly between answer boxes without using the mouse, use the ‘tab’ key.
- (12) If the number of tries is limited, be sure not to squander your first few tries. It is a mistake to guess. Think out your answer carefully before submitting it.
- (13) If you are unsure of how WeBWorK will interpret a complicated expression that you have entered in the answer box, you can click ‘Preview Answer’; which will show you how WeBWorK will parse your answer, and, if you are using typeset mode, it will typeset your answer. You are then free to either submit the answer as entered or to go back and make appropriate changes.

- (14) If the number of tries is limited and any of your answers contains brackets, it is highly recommended to preview your answer before submitting it. Unmatched parentheses will count as an error. Even professors make errors like this sometimes!
- (15) When printing assignments, it may be wise to check that all mathematical signs are correctly rendered. For example, we have seen the not equals sign rendered as the equals sign on a low resolution printer. If you are using Acrobat, you can view the document at very high resolution to check that you have everything as it should be.

6.4. What are the advantages of WeBWork.

- (1) A key educational benefit of this system is that if a student gets a wrong answer, the student gets immediate feedback while the problem is still fresh in their mind. The student can then correct a careless mistake, review the relevant material before attacking the problem again, or seek help from friends, the TA or the instructor.
- (2) Our teaching assistants do not have to spend their time correcting assignments. Instead they will spend more of their time where it counts, in contact with students.
- (3) It is theoretically possible to submit your assignment from a beach in the Caribbean or indeed anywhere else in the world.