The University of New South Wales

MATH1231 Mathematics 1B

MATH1241 Higher Mathematics 1B

INFORMATION BOOKLET

School of Mathematics and Statistics

2009

CONTENTS OF THE MATH1231/1241 COURSE PACK 2009

Your course pack should contain the following four items:

1. *Information Booklet*

   Information on administrative matters, lectures, tutorials, assessment, syllabuses, class tests, computing, special consideration and additional assessment

2. *Algebra Notes*

3. *Calculus Lecture Notes (for MATH1231/1241)*

4. *Past Exam Papers Booklet*

Information booklet contents

GENERAL INFORMATION FOR MATH1231 and MATH1241

Prerequisites

MATH1231, Mathematics 1B, is a first year 6UOC course offered by the School of Mathematics and Statistics in semester 2 and Summer Session. It develops the Calculus and Linear Algebra introduced in MATH1131, Mathematics 1A. MATH1241, Higher Mathematics 1B, is the higher version of MATH1231 and covers the topics of MATH1231, but in greater depth. Both courses contain an introduction to Statistics.

The prerequisite for MATH1231 is a conceded pass or better in either MATH1131 or MATH1141 whilst a distinction, or better, in MATH1131 or a credit or better in MATH1141 is required for enrolment in MATH1241. The exclusions for MATH1231 are MATH1021, MATH1031, MATH1241, MATH1251, ECON1202 and ECON2291. There are corresponding exclusions for MATH1241.

Aims

The aim of MATH1231/1241 is that by the time you finish the course you should understand the concepts and techniques covered by the syllabus and have developed skills in applying those concepts and techniques to the solution of appropriate problems. Students who achieve good competence in this course should be well equipped both technically and psychologically to cope with the mathematics that they will meet later in their program. It is expected that students will be able to use the Symbolic Computing Package Maple as an aid to solve problems that were generally inaccessible just a generation ago.

Learning Outcomes

A student should be able to:

- state definitions as specified in the syllabus,
- state and prove appropriate theorems,
- explain how a theorem relates to specific examples,
- apply the concepts and techniques of the syllabus to solve appropriate problems,
- prove specific and general results given specified assumptions,
- use mathematical and other terminology appropriately to communicate information and understanding,
- use the Symbolic Computing Package Maple as an aid to solve appropriate problems.

Advice to students

Students are advised to take particular note of the detailed syllabus and notes provided later in this document.

The level of depth of understanding required in this course is best understood by considering the exercises, the sample class tests and the past examination papers that are included in the MATH1231/1241 Course Pack.

Teaching Strategies

MATH1231 and MATH1241 are taught through carefully planned lectures that logically develop the concepts and techniques specified in the course. Examples are emphasised as they provide the underlying motivation for the course, and because students best understand the general theory when it is developed from simple, and then more complex, examples.

Small group tutorials allow students to apply the material introduced in the lectures. These tutorials provide the opportunity for individual assistance. Students are expected to work conscientiously at understanding the solutions to the exercises.

Self-paced online modules develop independent learning skills, introduce basic computing skills using a symbolic computing package and provide an opportunity to extend and enhance understanding of mathematical concepts by using computing power to enable attemps at more complex problems. Students are expected to work through the modules systematically in accordance with the published schedule. Consultants are available should assistance be required.

Students are encouraged to give constructive feedback to the teaching staff during the teaching semester. They are also encouraged to work collaboratively with other students in the course to develop their understanding and their problem solving skills.

Statement on Assessment

The School of Mathematics has responded to student and staff concerns about plagiarism in assignments. Consequently, all First Year Mathematics courses are assessed by randomly generated online tests, short class tests and a written examination. The online tests and short class tests provide regular feedback to students and allow the course to be broken into smaller segments to facilitate learning.

It is unusual for questions on class tests to be marked out of more than 3 or 4 marks, and advice is given to tutors as to how those marks are to be awarded. Generally part-marks are awarded according to the number of correct steps made in answering the question. Students should raise any concerns that they have regarding their marks with their tutor when their papers are returned. If their concerns are not satisfactorily resolved, they may speak to the First Year Director.

Detailed marking schemes are prepared for the marking of the end of semester examination and check marking is generally used for quality assurance. Marks will only be changed if the mark is inconsistent with the marking scheme. At the end of the marking process a committee of staff determines the pass mark and produces the final (scaled) marks.

Details regarding the tests and examination are given later in this document.

Contacting the First Year Office

The School of Mathematics and Statistics web-site

http://www.maths.unsw.edu.au

contains many pages of useful information on mathematics courses, school policies and how to obtain help, both academic and administrative. If you cannot find the answer to your queries on the web pages you are welcome to contact the First Year office directly.
The student administration officer in the First Year Office of the School of Mathematics and Statistics is Mrs N. Narouz (Neffi). All administrative enquiries concerning first year Mathematics courses should be sent to Mrs Narouz, either:

- by email to fy.MathsStats@unsw.edu.au

- by phone to 9385 7011
- or in person in room RC-3072 (between 9am to 12 noon or 2pm to 4pm)

Change of tutorials, due to timetable clashes or work commitments, permission to take class tests outside your scheduled tutorial, advice on course selection and other administrative matters are handled in the First Year Office. Constructive comments on course improvment may also be emailed to the First Year Office. Should we need to contact you, we will use your official UNSW email address of

zSTUDENTNO@student.unsw.edu.au

in the first instance.

Lecturers in charge

For the Algebra component:

Lecturer-in-charge A/Prof. J. Murray Room 3061, Red Centre

For the Calculus component:

Lecturer-in-charge A/Prof. J. Roberts Room 3065, Red Centre

For the Computing component:

Lecturer-in-charge Dr T. Bates Room 6107, Red Centre

Lectures

Students in MATH1231 and MATH1241 are generally enrolled in a lecture group, where a lecture group consists of a sequence of two Algebra lectures and two Calculus lectures each week. There are three lecture groups in MATH1231 and one in MATH1241.
Lectures commence in week 1 and run until week 12.

MATH 1241

	Monday	**Tuesday**	**Wednesday**	**Thursday**	**Friday**
Lectures	2-3 Alg Rex-Vowels Dooley 3-4 Calc Rex-Vowels Henry		10-11 Calc Rex-Vowels Henry 11-12 Alg Rex-Vowels Dooley		

It is important to note that:

- **If your timetable requires it, it is possible to take the algebra lectures from one group and the calculus lectures from another group,** but it is **not** possible to mix calculus lectures from two different groups or algebra lectures from two different groups (because the lecture groups do not keep exactly in step with each other).
- Important announcements and handouts may be given out in lectures, so missing lectures (or even arriving late) may cause significant difficulties for you.

MATH 1231

	Monday	**Tuesday**	**Wednesday**	**Thursday**	**Friday**
Lectures Group 1	2-3 Alg Mathews-A Grundling 3-4 Calc Mathews-A Blennerhassett		10-11 Calc Mathews-A Blennerhassett 11-12 Alg Mathews-A Grundling		
Lectures Group 2		9-10 Alg KBT Combe 10-11 Calc KBT Tisdell		3-4 Calc KBT Tisdell 4-5 Alg KBT Combe	
Lectures Group 3	9-10 Alg KBT Murray 10-11 Calc KBT Roberts		12-1 Calc KBT Roberts 1-2 Alg KBT Murray		

Tutorials

Students in MATH1231/1241 are enrolled in two tutorials, one for algebra and one for calculus. The algebra tutorial is timetabled for the second half of the week, whilst the calculus tutorial is scheduled for the first half of the week. Students are able to change their tutorials until the end of week 1, and after that time, they can only change their tutorials with the agreement of the First Year Office, RC3072. To change a tutorial you will need to provide proof of a timetable clash or work commitments.

Note that

- **ALL tutorials commence in week 2 and run until week 13**;
- attendance at tutorials is compulsory and the roll will be called in tutorials;
- some tutorial classes may have to be amalgamated or created after the start of semester to maintain efficient tutorial sizes. If you are affected by any tutorial room changes, you will be notified by an email to your official UNSW email account. During week 1 and 2, it is good practice to check your timetable regularly on myUNSW.

The main purpose of tutorials is to provide you with an opportunity to get help with any problems which you find difficult and any parts of the lectures or textbook which you don't understand. In order to get real benefit from tutorials you should

- Study your lecture notes and attempt relevant problems **before** the tutorial so that you can find out the areas in which you have difficulties.
- Make sure that your tutor is aware of the areas in which you need help.

- Be as specific as possible in describing your difficulties — don't just say "could you explain about series".

- Be an active participant in tutorials, asking and answering questions rather than just sitting and watching.

All the class tests which you submit (except formal examination scripts) will be marked by your tutor and returned through tutorials.

Computing and self-paced online modules

In addition to the Calculus and Algebra components, there is a Computing component in MATH1231/1241. This is mainly interwoven with the Algebra component of the course. To assist in the self-directed learning of this component of the course, online self-paced learning modules are available in My eLearning Vista. These modules guide students through the computing component of this course.

Students are expected to work through and complete the specified online modules by 5pm Friday of week 7. Each module contains a graded quiz and the completed four modules contribute 4% to the final grade. These modules are integrated with, and enhance the lecture and tutorial content presented in Calculus and Algebra. Learning content will be accessible at all times for learning and revision, but quizzes will only be available for credit until the published deadlines.

More information about the Computing component is given later in this booklet (see page 29) and in the booklet *Computing Laboratories Information and First Year Maple Notes 2009.* These computing notes are freely available from the MATH1231/1241 module on My eLearning, and also on the computers in the computing laboratories.

Computing consultants are available in laboratory G012 from 12noon to 4pm every weekday during weeks 1 to 9.

My eLearning Vista

The School of Mathematics and Statistics makes extensive use of the centrally provided electronic learning environment known as "My eLearning Vista". This information booklet, the algebra and calculus problems sets and computing information are all available via the appropriate course module on the My eLearning server. Access to this server is via any suitably configured web browser from any computer with an internet connection. The URL for My eLearning Vista is

http://vista.elearning.unsw.edu.au

and the School of Mathematics and Statistics web pages for Current Students also has a Quicklink to My eLearning Vista. From this page you will need to click the link "UNSW Online Courses", which takes you to another page where, after a warning about links to external sites, there is a "Log In" button to click. After clicking the Log In button you will be prompted for your User name (z immediately followed by your student number) and your Password, also known as your Unipass. Once logged in you will have a choice of modules for all your courses, including your current mathematics course. The home pages for all My eLearning Vista modules for First Year Mathematics courses have a similar structure, with links to "Important Information", "Course Materials", etc. The "Maths Info" is particularly important as this takes you to the log-in page of the Student Portal for the School of Mathematics and Statistics.

Once through this gateway you have access to your mathematics assessment marks, including results of any class tests that may be available and your provisional end of semester mark. You also set your mathematics computing laboratory password from this portal.

Course Materials

The course materials for MATH1231/1241 are:

MATH1231/1241 *Course Pack 2009.*

Computing Laboratories Information and First Year Maple Notes 2009.

S.L. Salas, E. Hille and G.J. Etgen, *Calculus - One and Several Variables*, any recent edition, Wiley.

The latest edition of the textbook, Salas, Hille and Etgen *Calculus - One and Several Variables*, 10th Edition comes packaged with access to the electronic resources known as WileyPlus. This electronic version provides internet access to the textbook, problems, worked solutions, tests (for self-assessment) and other electronic resources related to the text material. The purchase of the text from the UNSW Bookshop gives web access to the WileyPlus server for one year; it is possible to renew the web access on a yearly basis at a fee determined by the publisher. It is also possible to purchase just the web access to the electronic version of the textbook for one year. This can also be done at the UNSW Bookshop. Note that these WileyPlus electronic resources are provided by the publisher John Wiley, and **not** by the School of Mathematics and Statistics. Any difficulties that you might have with access to WileyPlus must be resolved directly with the publisher.

Salas & Hille is sold at the UNSW Bookshop. Course Packs and Computing Notes are sold through the UNSW Bookshop.

The Course Pack contains the following items:

- *Information Booklet that you are now reading;*
- *Algebra Notes;*
- *Calculus Lecture Notes (for MATH1231/1241);*
- *Past Exam Papers Booklet.*

Booklets contained in the Course Pack will **not** be available separately from the School of Mathematics and Statistics. However the information in this booklet and the algebra and calculus problems can be accessed through the web from the MATH1231 or MATH1241 module on the My eLearning Vista server.

Getting help outside tutorials

If you are having difficulty understanding the lectures or doing the suggested problems, always try to get help through your tutorials. In most cases there will be other students who are having the same difficulties and it is better to provide help to all at once rather than giving the same explanation to ten or twenty students individually outside class.

However, there may be occasions when there is not enough time to get your questions answered in a tutorial. In these cases you should be able to get some help outside tutorials. If your tutor is a full-time member of staff you can ask them for their room number and times when they are available to see students (many members of staff put a notice on their office door showing the times when they are available). Tutors who are not full-time members of staff are

not required to be available outside tutorial class times and may not have offices in the School of Mathematics and Statistics. To cover students whose tutor is not available, there is a roster which shows for each hour of the week a list of names of members of staff who are available at that time to help students in first year mathematics courses. This roster is displayed on the noticeboard near the School Office (Room 3070, Red Centre) and outside the First Year Office.

You can also avail yourself of the **Student Support Scheme**. This Scheme is financed by the School of Mathematics and Statistics and is staffed by later year mathematics students.

Student Support Scheme

The Student Support Scheme (SSS) is a drop-in consultation centre where students can come for free help with certain first- and second-year mathematics courses. The type of help offered by the tutors of the SSS is either one-on-one assistance; or, at busier times, assistance in small groups. Students typically bring their partial solutions of mathematics coursepack questions to the SSS office. An SSS tutor then provides guidance and advice. The SSS office is located in **RC-3064**. During semester 2, 2009 the SSS has opening times from **10am–12noon** and **1pm–3pm** from **Mondays to Fridays**. The times are extended up to 3pm–4pm on Fridays.

The courses the SSS services in semester 2 will be MATH1011, MATH1041, MATH1131, MATH1231, MATH2019 and MATH2089. The schedule will be available on the SSS website at

http://www.maths.unsw.edu.au/students/current/help/sss.html

by the end of Week 1. Please remember that there is no appointment needed. Just drop-in and you will be able to obtain one-on-one help from SSS tutors.

Problem sets

Problems for Algebra are included in the Algebra Notes and problems for Calculus are included in the Calculus Notes. These problems sets are also available via my eLearning.

Remember that Mathematics, like tennis, can't be learnt just by watching someone else do it. **The key to success is to work through all the problem sets in your own time.** To get the most out of tutorials, you should attempt the relevant problems (as indicated in the problem schedules) **before** the tutorial so that you know which problems you find difficult.

Calculator Information

For end of semester UNSW exams students must supply their own calculator. Only calculators on the UNSW list of approved calculators may be used in the end of semester exams. This list is similar to the list of calculators approved for HSC examinations.

BEFORE the exam period calculators must be given a "UNSW approved" sticker, obtainable from the School of Mathematics and Statistics Office, and other student or Faculty centres. The UNSW list of calculators approved for use in end of semester exams is available at

https://my.unsw.edu.au/student/academiclife/assessment/examinations/Calculator.html

Assessment

The final raw mark will be made up as follows:

Algebra and Calculus class tests	20%
Online Algebra and Calculus tests	4%
Online Computing test (Maple)	4%
Laboratory Computing test (Maple)	8%
End of semester exam	64%

Note that:

- You will **not** be allowed to take a calculator into class tests.

- Tutors are expected to enter class test marks into the School's database within a fortnight of the test being sat. These marks are then available to you through the Student Web Portal accessed via the "Maths Info" link on the home page of MATH1231/1241 on the UNSW My eLearning server. It is **your responsibility** to check that these marks are correct and you should **keep marked tests until the end of semester** in case an error has been made in recording the marks. If there is an error, either speak to your tutor or bring your test paper to the First Year Office as soon as possible but no later than Friday 30th October

- Your final raw mark is scaled by the School of Mathematics and Statistics to produce your final mark. This is done so that the final distribution of marks is consistent with general university guidelines regarding the percentages of students with various grades, and to maintain consistent standards from year to year. A small committee of the teaching staff determines this final scaling.

- Once the examinations section finalises the examination timetable, you will be able to find out the time and place of the MATH1231/1241 examination from myUNSW. The web page

  https://my.unsw.edu.au/student/academiclife/assessment/examinations/examinations.html

  has many useful links related to the running of UNSW examinations.

- Be aware that a **final mark of 49 often means that the course has been failed and has to be repeated.** Therefore, it is very important that you attempt all tests.

- If your final mark is in the range 46-49 then you may be awarded the grade of "Pass Conceded" provided your average mark for all your courses is sufficiently high. This decision is not made by the School of Mathematics and Statistics.

- **Medicals will generally not be accepted for the online or computing tests**. See the section on "Computing Information".

Online Algebra and Calculus tests

Before the algebra and calculus tutorial class tests you must complete a simple online test that is designed to help you prepare for the tutorial tests. These tests are accessed via the web page

http://mapleta.elearning.unsw.edu.au/mapleta

The schedule for these online tests for MATH1231 is given below.

Test	**Available**	**Due**
TP1 - Math 1B Calculus online test 1	2pm Wednesday 5/8/2009	4pm Friday 14/8/2009
TP2 - Math 1B Algebra online test 1	2pm Monday 17/8/2009	1pm Wednesday 26/8/2009
TP3 - Math 1B Calculus online test 2	2pm Wednesday 2/9/2009	4pm Friday 18/9/2009
TP4 - Math 1B Algebra online test 2	2pm Wednesday 30/9/2009	1pm Wednesday 14/10/2009

The schedule for these online tests for MATH1241 is given below.

Test	**Available**	**Due**
TP1 - Math 1B Calculus online test 1	2pm Wednesday 5/8/2009	4pm Wednesday 12/8/2009
TP2 - Math 1B Algebra online test 1	2pm Monday 17/8/2009	4pm Monday 24/8/2009
TP3 - Math 1B Calculus online test 2	2pm Wednesday 2/9/2009	4pm Wednesday 16/9/2009
TP4 - Math 1B Algebra online test 2	2pm Wednesday 30/9/2009	4pm Monday 12/10/2009

The material covered by these tests is the same as for the tutorial algebra and calculus tests, as given on page 23 and 27.

Detailed information on how to use the online testing system is available from the MATH1231 or MATH1241 course module on My eLearning in the "Online Tests" section of the "Course Materials" folder. In this section there is also a link, labelled Maple TA, to the web page where the tests are available. Despite the name "Maple" appearing in the link, these online tests are algebra and calculus tests and should **not** be confused with any other online test. To give you some familiarity with the online testing system a practice test will be available from week 1.

You will be allowed 3 attempts at each online test but only your best mark for each test will count. Then, the best 3 of these 4 marks, one from each online test, will contribute up to 4% of your final grade.

Note:

- the first test becomes available on Wednesday of week 3;
- each attempt at these tests must be your own work, but you are encouraged to discuss the methods required with other students;
- each version of a test will be slightly different, so don't just copy answers from one attempt to the next.

Class tests

Details of the dates and content of tests are given later in this booklet. Sample copies of the tests are included in the Algebra and Calculus Notes.

Note that

- You **MUST** be enrolled in an Algebra tutorial and a Calculus tutorial and **YOU MUST TAKE EACH TEST IN THE TUTORIAL TO WHICH YOU HAVE BEEN OFFICIALLY ALLOCATED.**
- To each test you must bring
  - your **Student ID** card
  - some blank A4 writing paper
  - a **stapler** (so that you can staple a cover sheet to your answers).
- Normal exam conditions apply in tests. In particular, you must not bring any kind of written material into the test and you must not try to get assistance from (or give assistance to) any other person.
- You will **not** be allowed to use a calculator in class tests.
- When your test answers have been marked and handed back to you by your tutor, don't try to change your answers or falsify the marks awarded — a student who tried to do this recently was penalised by being given a failure in the course.
- Your **best three scores** in the four tests will be counted towards your final assessment mark.

Interpretation of test results

The average mark for tests in MATH1231 is between 6 and 7 out of 10. Past experience is that students are likely to have difficulty passing this course if their average test mark is less than 5. If you find that your average after the first two tests is less than 5, you should talk to your tutors about your situation and what you can do about it.

Graduate Attributes

This course will provide you with a good working knowledge of Calculus and Linear Algebra, and show, through the lectures, how this mathematics can be applied in interdisciplinary contexts. Your skills in analytical critical thinking and problem solving will improve because of the illustrative examples used in lectures and because of the problem based tutorial classes. These mathematical problem solving skills, which are based on logical arguments and specific techniques, are generic problem solving skills that can be applied in multidisciplinary work. You will be encouraged to develop your communication skills through active participation in tutorials, and by writing clear, logical arguments when solving problems.

Academic misconduct

It is very important that you understand the University's Rules for the conduct of Examinations and the penalties for Academic Misconduct Guide. This information can be accessed through myUNSW at:

https://my.unsw.edu.au/student/academiclife/assessment/examinations/examinations.html.

In recent years there have been cases where severe penalties have been imposed for misconduct in relation to tests and exams in Mathematics courses.

Illness and other problems

If your performance in this course is affected by illness or other serious difficulties which are beyond your control, you can apply for Special Consideration and you may be offered the opportunity for Additional Assessment. See also the sub-section *Getting advice* on page 15.

In order to be offered Additional Assessment it is essential that you **follow exactly the procedures set out in the document entitled "Application for Special Consideration in MATH1231, MATH1241 and MATH1251 2009".** A copy of this document is included in this booklet on page 17. You should read it carefully now and keep it for reference at the time when you actually need it. Each year there are some students who fail a course because they didn't follow these instructions. Take particular note that

- The School will **NOT** contact you to tell you that you have been granted Additional Assessment. It is **YOUR RESPONSIBILITY** to find this out by following the instructions in the document mentioned above.
- **If you have a poor record of attendance or performance during the semester you may be failed regardless of illness or compassionate grounds affecting the final exam.**

Note also that

- If illness affects your attendance at or performance in a **class test**, do **not** make an application for Special Consideration. Simply show a medical certificate to your tutor and this will be taken into account when calculating your final assessment mark.
- Transport delays and oversleeping will **not** be accepted as reasons for missing class tests. (But note that only your best three test results are counted for assessment.)
- Because it is possible to sit the computing tests on many days, **except in unusual circumstances, medicals will not be accepted as excuses for not sitting the computing test.** Therefore, it is recommended that you book to sit at an early time.
- If you arrive too late to be admitted to the end of semester exam, go **immediately** to the Mathematics and Statistics First Year Office, Room 3072, Red Centre.

Past examinations

Recent exam papers, with their solutions, are included in a separate booklet in the Course Pack.

Information and handouts

Important announcements may be made in lectures. If you miss a lecture or tutorial, or arrive late for it, it is essential that you check whether you have missed any announcements or handouts. All important administrative announcements, especially those indicating a change to information contained in this booklet, are repeated as announcements on My eLearning. Further, notices of an urgent nature may be emailed to students at their official UNSW email address.

School of Mathematics and Statistics Policies

The School of Mathematics and Statistics has adopted a number of policies relating to enrolment, attendance, assessment, plagiarism, cheating, special consideration etc. These are in addition to the policies of the University. Individual courses may also adopt other policies in addition to or replacing some of the School ones. These will be clearly notified in the Course Initial Handout and on the Course Home Page on the MathsStats web site. Students in courses run by the School of Mathematics and Statistics should be aware of the School and Course policies by reading the appropriate pages on the MathsStats web site starting at:

http://www.maths.unsw.edu.au/students/current/policies/studentpolicy.html

The School of Mathematics and Statistics will assume that all its students have read and understood the School policies on the above pages and any individual course policies on the Course Initial Handout and Course Home Page. Lack of knowledge about a policy will not be an excuse for failing to follow the procedures in it.

Summer session MATH1231

If your provisional marks in MATH1231 or MATH1241 do NOT indicate a clear pass, and if this course is compulsory for your program and you wish to complete your degree in minimum time, you are advised to enrol **immediately** in summer session MATH1231, even if you expect to be granted additional assessment in the semester two course.

Provisional marks for MATH1231 and MATH1241 will be available late on Friday 20th November and summer session MATH1231 commences on Monday 23rd November. Additional assessment results for semester 2 MATH1231 and MATH1241 will not be available until Monday 7th December, when it is too late to enrol in summer session MATH1231 (as one quarter of the course has already passed).

In summary, it is painless to withdraw from summer session MATH1231 (if you end up passing semester 2 MATH1231) but missing out on passing MATH1231 in summer can severely disrupt your degree program.

At the time of printing this booklet the HECS census date for summer session had not been set.

Course improvement

The School of Mathematics and Statistics has several mechanisms in place for regular review and improvement of First Year courses. One component of the review process is student feedback, generated either by the CATEI surveys or by direct contact from individual students or groups of students. Other elements of our course review processes include:

- feedback on program requirements from academics in other Schools and Faculties;

- regular rotation of lecturing staff teaching First Year courses to generate fresh and innovative approaches to the course content and structure;
- regular review of the quality of the tutors and tutorial problems.

A recent change, requested in several CATEI surveys, is the expansion of the previous "Outline calculus lecture notes" for MATH1131 and MATH1231 to a complete set of calculus notes, comparable to the well liked algebra lecture notes. Another recent change has been the introduction of short, online tests for Maple associated with the redesigned self-paced Maple learning modules. These changes were again in response to CATEI requests to provide more assistance with learning Maple.

Getting advice

Your Algebra and Calculus tutors should be able to give you most of the advice you need on mathematical and administrative matters concerning MATH1231 or MATH1241.If they cannot help you, try your lecturers or one of the two Lecturers-in-charge (their names and room numbers are shown on page 5 of this booklet). If your problems are more serious, or haven't been resolved to your satisfaction, come to see me (Peter Blennerhassett) at Room 3072, Red Centre. I am happy to see you.

If you have general study problems or personal problems, don't just hope that they will go away — take advantage of the free and confidential help which is available within the university. The Learning Centre (Room 231 on Level 2 of the Library) provides individual consultations and workshops on study skills, time management, stress management, English language, etc. The Counselling Service (2nd Floor, East Wing, Quadrangle Building) offers the opportunity to discuss any issue which concerns you including academic problems, personal relationships, administrative hassles, vocational uncertainty, sexual identity and financial hardship. For more details, see the UNSW Student Guide.

Peter Blennerhassett
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ADDITIONAL INFORMATION FOR MATH1241 HIGHER MATHEMATICS 1B

This additional information applies only to students enrolled in *Higher* Mathematics 1B.

Content

Higher Mathematics 1B includes everything which is in MATH1231 Mathematics 1B and this accounts for 85% of the content of the Higher subject. The remaining time is spent treating some of the common topics in greater depth and covering some extra topics. This booklet contains separate Calculus syllabuses for MATH1231 and MATH1241. For Algebra there is a syllabus for MATH1231 and a list of extra topics for MATH1241.

Problem sets

The basic problem sets for MATH1241 are the same as for MATH1231, but you should pay special attention to the problems labelled [H] and [X] because they are particularly intended for students in the Higher subject. At the same time, it is important that you work through all the [R] labelled questions to make sure that you get adequate practice on more routine problems. It is possible that some additional problem sheets may be issued for Higher students.

Assessment

All grades from High Distinction to Fail are awarded in both MATH1231 and MATH1241. **Marks in Higher Mathematics 1B will be scaled so that students in the Higher subject are not at any disadvantage compared to students in the ordinary course MATH1231.** The online preparation tests, class tests and computing tests for MATH1241 are the same as those for MATH1231. However, the MATH1241 end of semester exam will contain questions that are quite different from those in the MATH1231 exam. Unlike the years prior to 2008, there will be, at most, one complete question common to the MATH1231 and MATH1241 exam.

APPLICATIONS FOR SPECIAL CONSIDERATION IN MATH1231, MATH1241 AND MATH1251 SEMESTER 2 2009

If you feel that your performance in, or attendance at, a final examination has been affected by illness or circumstances beyond your control, or if you missed the examination because of illness or other compelling reasons, you may apply for special consideration. Such an application **may** lead to the granting of additional assessment.
It is essential that you take note of the rules 1, 2, 5 and 6, which apply to applications for special consideration in all first year Mathematics courses. Rules 3 and 4 apply to the above courses only.

1. **Within 3 days** of the affected examination, or at least as soon as possible, you must **submit a request for special consideration to UNSW Student Central** (Lower Ground Floor, The Chancellery) **on a special form**, which is available from the Student Central. Please note that in cases of sickness both parts **A and B** of the application form must be completed and the School of Mathematics and Statistics **will not process** an application unless part B has been fully completed by an appropriate professional. In cases other than sickness, appropriate documentation must be supplied with the application.

2. **You will NOT be granted additional assessment in a course if your performance in the course** (judged by attendance, class tests, assignments and examinations) **does not meet a minimal standard**. A total mark of at least 40% on all assessment not affected by a request for special consideration will normally be regarded as the minimal standard for award of additional assessment.

3. It is **YOUR RESPONSIBILITY** to find out **FROM THE SCHOOL OF MATHEMATICS AND STATISTICS** whether you have been granted additional assessment and when and where the additional assessment examinations will be held. **Do NOT wait to receive official results from the university**, as these results are not normally available until after the Mathematics additional assessment exams have started. Information about award of additional assessment is available from the School of Mathematics and Statistics in the following ways:

   a) A **provisional** list of results in all Mathematics courses and and final list of grants of additional assessment will be available via the "Maths Info" link in the My eLearning module for your course late on **Friday 20th November**.

   b) On **Monday 23rd November ONLY**, you may telephone the School Office (9385 7111) to find out whether you have been granted additional assessment and where and when it will be held. **Note that examination results will not be given over the phone.**

4. The **timetables** for the additional assessment examinations will be available on the Mathematics website at the same time as the provisional list of results.

   The Semester 2 additional assessment examinations for the above courses will be held on the days **Tuesday 24th November to Wednesday 25th November**.

5. If you have two additional assessment examinations scheduled for the same time, please consult the School of Mathematics and Statistics Office as soon as possible so that special arrangements can be made.

6. You will need to produce your UNSW Student Card to gain entry to additional assessment examinations.

IMPORTANT NOTES

- The additional assessment examination may be of a different form from the original examination and must be expected to be at least as difficult.
- If you believe that your application for special consideration has not been processed, you should immediately consult the Director of First Year Studies of the School of Mathematics and Statistics (Room 3072 Red Centre).
- If you believe that the above arrangements put you at a substantial disadvantage, you should, at the earliest possible time, send full documentation of the circumstances to the Director of First Year Studies, School of Mathematics and Statistics, University of New South Wales, Sydney, 2052.

In particular, if you suffer from a chronic or ongoing illness that has, or is likely to, put you at a serious disadvantage (or you have suffered misadventure of equivalent seriousness) then you should contact the Director of First Year Studies as soon as possible. In these circumstances it may be possible to arrange discontinuation without failure or to make special examination arrangements.

Professor A.H. Dooley
Head, School of Mathematics and Statistics

UNIVERSITY STATEMENT ON PLAGIARISM

Plagiarism is the presentation of the thoughts or work of another as one's own.[1] Examples include:

- direct duplication of the thoughts or work of another, including by copying work, or knowingly permitting it to be copied. This includes copying material, ideas or concepts from a book, article, report or other written document (whether published or unpublished), composition, artwork, design, drawing, circuitry, computer program or software, web site, Internet, other electronic resource, or another person's assignment without appropriate acknowledgement
  - paraphrasing another person's work with very minor changes keeping the meaning, form and/or progression of ideas of the original;
  - piecing together sections of the work of others into a new whole;
  - presenting an assessment item as independent work when it has been produced in whole or part in collusion with other people, for example, another student or a tutor; and,
  - claiming credit for a proportion a work contributed to a group assessment item that is greater than that actually contributed[2].

Submitting an assessment item that has already been submitted for academic credit elsewhere may also be considered plagiarism. The inclusion of the thoughts or work of another with attribution appropriate to the academic discipline does not amount to plagiarism.
Students are reminded of their Rights and Responsibilities in respect of plagiarism, as set out in the University Undergraduate and Postgraduate Handbooks, and are encouraged to seek advice from academic staff whenever necessary to ensure they avoid plagiarism in all its forms.
The Learning Centre website is the central University online resource for staff and student information on plagiarism and academic honesty. It can be located at:
www.lc.unsw.edu.au/plagiarism
The Learning Centre also provides substantial educational written materials, workshops, and tutorials to aid students, for example, in:

- correct referencing practices;
- paraphrasing, summarising, essay writing, and time management;
- appropriate use of, and attribution for, a range of materials including text, images, formulae and concepts.

Individual assistance is available on request from The Learning Centre. Students are also reminded that careful time management is an important part of study and one of the identified causes of plagiarism is poor time management. Students should allow sufficient time for research, drafting, and the proper referencing of sources in preparing all assessment items.

[1] Based on that proposed to the University of Newcastle by the St James Ethics Centre. Used with kind permission from the University of Newcastle.

[2] Adapted with kind permission from the University of Melbourne

ALGEBRA SYLLABUS AND LECTURE TIMETABLE

The algebra course for both MATH1231 and MATH1241 is based on chapters 6 to 9 of the Algebra Notes. Lecturers will not cover all of the material in these notes in their lectures as some sections of the notes are intended for reference and for background reading.

The following timetable is the basic timetable and syllabus which will be followed by MATH1231 algebra lecturers. MATH1241 lecturers will include extra material in their lectures. Lecturers will try to follow this timetable, but some variations are inevitable.

Chapter 6. Vector Spaces

The aim of this section of the course is to introduce the general theory of vector spaces and to give some basic examples. The majority of examples will be for the real vector space $\mathbb{R}^n$, but occasional examples may be given for the complex vector space $\mathbb{C}^n$, as well as from vector spaces of polynomials.

Lectures 1 and 2. Introduction to vector spaces and examples of vector spaces (6.1). Properties of vector arithmetic (6.2).
Lecture 3. Subspaces (6.3).
Lectures 4 and 5. Linear combinations and spans (6.4). Linear independence (6.5).
Lectures 6 and 7. Basis and dimension (6.6).

Chapter 7. Linear Transformations

The basic aims of this section are to introduce the general theory of linear transformations, to give some geometric applications of linear transformations and to establish the close relationship between linear functions and matrices.

Lecture 8. Introduction to linear maps (7.1). Linear maps and the matrix equation (7.2).
Lecture 9. Geometrical examples (7.3).
Lecture 10. Subspaces associated with linear maps (7.4).
Lecture 11. Rank, nullity and solutions of $A\mathbf{x} = \mathbf{b}$ (7.4.3). Further applications (7.5).

Chapter 8. Eigenvalues and Eigenvectors

The aims of this section are to introduce the ideas of eigenvalue and eigenvector and to show some applications of these ideas to diagonalization of matrices, evaluation of powers of matrices and solution of simple systems of linear differential equations. Examples will be restricted to 2×2 matrices and very simple 3×3 matrices.

Lecture 12. Definition, examples and geometric interpretation of eigenvalues and eigenvectors (8.1).
Lecture 13. Eigenvectors, bases and diagonalization of matrices (8.2).
Lectures 14 and 15. Applications to powers of matrices and solution of systems of linear differential equations (8.3).

Chapter 9. Probability and Statistics

The main objective of this section is to introduce some of the ideas in mathematical probability and apply these concepts to discrete valued random variables and their associated probability distributions. Applications of two discrete probability distributions to commonly occurring issues are used throughout this chapter to illustrate the wide range of problems that can be tackled with simple, but careful probabilistic analysis.

Lecture 16. Introduction to probability via examples from recent events and classical problems (9.1).
Lecture 17. Revision of set theory (9.2). Mathematical probability (9.3.1, 9.3.2).
Lecture 18. Probabilities and probability rules, counting rules and associated problems, statistical independence (9.3.3–9.3.6).
Lecture 19. Conditional probability and Bayes' rule (finish 9.3). Discrete random variables (9.4). Mean and variance of a discrete random variable (9.4.1).
Lecture 20. Binomial distribution and applications (9.5.1, 9.5.2).
Lecture 21. Geometric distribution and applications, the Chebyshev inequality (9.5.3, 9.5.4).
Lecture 22. Estimating proportions, margin of error and applications (9.6)
Lecture 23. Review.

EXTRA ALGEBRA TOPICS FOR MATH1241

The extra topics in the MATH1241 syllabus, marked [**X**] in the notes will be selected from the following:
Vector spaces. Matrices, polynomials and real-valued functions as vector spaces (6.8). Coordinate vectors (6.7). The theoretical treatment of vector spaces in MATH1241 will be at a slightly more sophisticated level than that in MATH1231.
Linear transformations.Linear maps between polynomial and real-valued function vector spaces (7.5). Matrix representations for non-standard bases in domain and codomain (7.6). Matrix arithmetic and linear maps (7.7). Injective, surjective and bijective linear maps (7.8). Proof the rank–nullity theorem (7.9).
Eigenvalues and eigenvectors. Markov Chain Processes (8.3.3). Eigenvalues and eigenvectors for symmetric matrices and applications to conic sections.
Probability and statistics. Jointly distributed random variables (9.9). Poisson and other discrete probability distributions.

PROBLEM SETS

At the end of each chapter there is a set of problems. Some of the problems are very easy, some are less easy but still routine and some are quite hard. To help you decide which problems to try first, each problem is marked with an [**R**], an [**H**] or an [**X**]. The problems marked [**R**] form a basic set of problems which you should try first. Problems marked [**H**] are harder and can be left until you have done the problems marked [**R**]. You *do* need to make an attempt at the [**H**] problems because problems of this type will occur on tests and in the exam. If you have difficulty with the [**H**] problems, ask for help in your tutorial. The problems marked [**X**] are intended for students in MATH1241 – they relate to topics which are only covered in MATH1241. Extra problem sheets for MATH1241 may be issued in lectures.

There are a number of questions marked [**M**], indicating that MAPLE is required in the solution of the problem.

PROBLEM SCHEDULE

The main purpose of tutorials is to give you an opportunity to get help with problems which you have found difficult and with parts of the lectures or the Algebra Notes which you don't understand. In order to get real benefit from tutorials, it is essential that you try to do relevant problems *before* the tutorial, so that you can find out the areas where you need help. The following table is a guide as to the problems which you should try to do before each tutorial. Tutors will not strictly follow this schedule.

Week	**Algebra problems**		**Homework**
	Chapter	Problems up to	**Problems**
1	No tutorial, but try the revision questions		
2	6	20	2, 3, 10, 11, 16, 18
3	6	39	22, 24, 28, 34, 38
4	6	54	40, 44, 47, 49, 50
5	6	67	55, 59, 62, 64
	7	12	2(c), 4,7,8
6	7	23 (Test 1)	13(c), 15, 16, 19
7	7	59	26(b), 31(b), 33(for 25(a)), 37, 38, 47, 56
8	8	15	2, 4, 7(d), 11(for 7(a)), 12
9	8	29	16, 18(for 7(a)), 20, 21(a)
10	9	15	3, 6, 7, 8, 10, 12
11	9	32	16, 18, 19, 29, 30
12	9	43 (Test 2)	34, 36, 38, 40
13	9	51	41, 42, 44, 45, 47, 50

Students in MATH1241 should also attempt a selection of the [**X**] labelled problems 68–101 from Chapter 6, 60–70 from Chapter 7 and 52–55 from Chapter 9 as indicted by the lecturer.

CLASS TESTS AND EXAMS

Questions for the class tests in MATH1231 and MATH1241 will be similar to the questions marked [**R**] and [**H**] in the problem sets. Since each class test is only twenty minutes in length only shorter straight forward tests of theory and practice will be set. As a guide, see the recent past class test papers (at the end of the Algebra notes).

Examination questions are, by their nature, different from short test questions. They may test a greater depth of understanding. The questions will be longer, and sections of the course not covered in the class tests will be examined. As a guide, see the recent past exam papers in the separate past exam papers booklet.

Algebra class test 1 will be given in week 6 and will be based on the suggested problems from for weeks 2 to 5.

Algebra class test 2 will be given in week 12 and will be based on the suggested problems for weeks 6 to 11.

THEORY IN THE ALGEBRA COURSE

The theory is regarded as an essential part of this course and it will be examined both in class tests and in the end of year examination.

You should make sure that you can give DEFINITIONS of the following ideas:
Chapter 6. Subspace of a vector space, linear combination of a set of vectors, span of a set of vectors, linear independence of a set of vectors, spanning set for a vector space, basis for a vector space, dimension of a vector space.
Chapter 7. Linear function, kernel and nullity of a linear function, image and rank of a linear function.
Chapter 8. Eigenvalue and eigenvector, diagonalizable matrix.
Chapter 9. Probability, statistical independence, conditional probability, discrete random variable, expected value (mean) of a random variable, variance of a random variable, binomial distribution, geometric distribution, margin of error.

You should be able to give STATEMENTS of the following theorems and propositions.

Chapter 6. Theorem 1 of §6.3, Propositions 1 and 3 and Theorem 2 of §6.4, Proposition 1 and Theorems 2, 3, 4, 5 and 6 of §6.5, Theorems 1, 2, 3, 4, 5, 6 and 7 of §6.6.
Chapter 7. Theorems 2, 3 and 4 of §7.1, Theorem 1 and 2 of §7.2, Proposition 7 and Theorems 1, 5, 8, 9 and 10 of §7.4.
Chapter 8. Theorems 1, 2 and 3 of §8.1, Theorem 1 and 2 of §8.2.
Chapter 9. Theorem 2 of §9.3, Theorems 1, 2 and 3 of §9.4

You should be able to give PROOFS of the following theorems and propositions.

Chapter 6. Theorem 2 of §6.4, Theorems 2, 3 and 4 of §6.5, Theorem 2 of §6.6.
Chapter 7. Theorem 2 of §7.1, Theorem 1 of §7.2, Theorems 1, 5 and 8 of §7.4.
Chapter 8. Theorem 1 of §8.1.
Chapter 9. Theorems 2 and 3 of §9.4.

CALCULUS SYLLABUS FOR MATH1231 MATHEMATICS 1B

In this syllabus the references to the textbook are *not* intended as a definition of what you will be expected to know. They are just a guide to finding relevant material. Some parts of the subject are not covered in the textbook and some parts of the textbook (even in the sections mentioned in the references below) are not included in the subject. The scope of the course is defined by the content of the lectures and problem sheets. The approximate lecture time for each section is given below. References to the 8th and 10th editions of Salas & Hille are shown as SH8 and SH10.

	SH8	**SH10**
1. **Functions of several variables.** (3 hours)		
Contours and level curves, partial derivatives.	14.1-14.4	15.1-15.4
Mixed derivative theorem, increment estimation.	14.6	15.6
Chain rules, tangent planes.		
2. **Integration techniques.** (4 hours)		
Trigonometric integrals and reduction formulae.	8.3	8.3
Trigonometric and hyperbolic substitutions.	8.4	8.4
Rational functions and partial fractions.	8.5	8.5
Further substitutions.	8.6	8.6
3. **Ordinary differential equations.** (6 hours)		
Particular, general, explicit and implicit solutions.	18.1	
1st order equations: separable, linear, exact.	8.9, 18.2, 15.9	9.1, 9.2, 19.1, 19.2
Modelling with odes		9.1, 9.2
2nd order linear equations with constant coeffts: homogeneous, non-homogeneous (undetermined coeffts).	18.3, 18.4	9.3, 19.4
4. **Taylor series.** (7 hours)		
Taylor polynomials, Taylor's theorem. Application to stationary points.	11.5	12.6, 12.7
Sequences: convergence and divergence; combination of sequences.	10.2, 10.3	11.2-11.4
Series: partial sums; convergence;	11.1, 11.2	12.1, 12.2
kth term test for divergence; comparison and ratio tests;	11.1-11.3	12.3,12.4
alternating series (Leibniz' test); absolute and conditional convergence; rearrangement of series.	11.4	12.5
Taylor and Maclaurin series.	11.6	12.7
Power series; radius and interval of convergence; operations on power series.	11.7, 11.8	12.8, 12.9
5. **Applications of integration.** (3 hours)		
Average value of a function.	5.8	5.9
Arc length.	9.8	10.7
Arc length in polar coordinates.	9.5, 9.8	10.7
Area of surfaces of revolution.	9.9	10.8

CALCULUS SYLLABUS FOR MATH1241 HIGHER MATHEMATICS 1B

This is the syllabus for *Higher* Mathematics 1B.
In this syllabus the references to the textbook are *not* intended as a definition of what you will be expected to know. They are just a guide to finding relevant material. Some parts of the subject are not covered in the textbook and some parts of the textbook (even in the sections mentioned in the references below) are not included in the subject. The scope of the subject is defined by the content of the lectures and problem sheets. The approximate lecture time for each section is given below. References to the 8th and 10th editions of Salas & Hille are shown under SH8 and SH10 and references to *Calculus* by M. Spivak under Sp.

	SH8	**SH10**	**Sp**
1. **Functions of several variables.** (3 hours)			
Contours and level curves, partial derivatives.	14.1-14.4	15.1-15.4	
Mixed derivative theorem, increment estimation.	14.6	15.6	
Chain rules, tangent planes.			
2. **Integration techniques.** (4 hours)			
Trigonometric integrals and reduction formulae.	8.3	8.3	18
Trigonometric and hyperbolic substitutions.	8.4	8.4	18
Rational functions and partial fractions.	8.5	8.5	18
Further substitutions.	8.6	8.6	18
3. **Ordinary differential equations.** (6 hours)			
Particular, general, explicit and implicit solutions.	18.1		
1st order equations: separable, linear, exact.	8.9, 18.2, 15.9	9.1, 9.2, 19.1, 19.2	
Modelling with odes		9.1, 9.2	
2nd order linear equations with constant coeffts: homogeneous, non-homogeneous (undetermined coeffts).	18.3, 18.4	9.3, 19.4	
4. **Taylor series.** (7 hours)			
Taylor polynomials, Taylor's theorem.	11.5	12.6, 12.7	
Application to stationary points.			
Sequences: convergence and divergence; combination of sequences.	10.2, 10.3	11.2-11.4	21
Upper, lower bounds, sup and inf,	10.1-10.3	11.1	8, 21
bounded monotonic sequences.	10.2	11.1	
Recursively defined sequences.			
Series: partial sums; convergence;	11.1, 11.2	12.1, 12.2	22
kth term test for divergence;			
comparison, integral, ratio and root tests;	11.1-11.3	12.3,12.4	22
alternating series (Leibniz' test);			
absolute and conditional convergence; rearrangement of series.	11.4	12.5	22
Taylor and Maclaurin series.	11.6	12.7	19
Power series: radius and interval of convergence; operations on power series.	11.7, 11.8	12.8, 12.9	23
5. **Applications of integration.** (3 hours)			
Average value of a function.	5.8	5.9	
Arc length in Cartesian and polar coordinates.	9.5, 9.8	10.7	
Area of surfaces of revolution.	9.9	10.8	

PROBLEM SETS

The Calculus problems are located at the end of each chapter of the Calculus Notes booklet. They are also available from the course module on the My eLearning Vista server. Some of the problems are very easy, some are less easy but still routine and some are quite hard. To help you decide which problems to try first, each problem is marked with an [**R**], an [**H**] or an [**HH**]. A few problems are marked with an [**X**] for MATH1241 students.

All students should make sure that they attempt the questions marked [**R**]. The problems marked [**H**] or [**HH**] are intended as a challenge for students in MATH1231 as well as MATH1241. Some harder parts of [**R**] problems are marked with a star. Any problems which depend on work covered only in MATH1241 are marked [**X**].

Remember that working through a wide range of problems is the key to success in mathematics.

PROBLEM SCHEDULE

The main reason for having tutorials is to give you a chance to get help with problems which you find difficult and with parts of the lectures or textbook which you don't understand. To get real benefit from tutorials, you need to try the relevant problems *before* the tutorial so that you can find out the areas in which you need help. The following table lists the complete set of problems relevant to each tutorial and a suggested (minimal) set of homework problems for MATH1231 that you should complete **BEFORE** the tutorial. Your tutor will only cover these in class if you have already tried them and were unable to do them. You may also be asked to present solutions to these homework questions to the rest of the class. Students in MATH1241 should do the mininal set of homework questions and some of the [**H**] and [**X**] problems as well. Tutors may need to vary a little from this suggested problem schedule.

Week	**Calculus problems**		**Homework**
	Chapter	Problems up to	**Problems**
1	No tutorial, but try the revision questions		
2	1	10	1(c), 3(c), 4(d), 7
3	1	17	12
	2	5	1(e), 1(f), 1(k), 2(c), 3(b), 3(e)
4	2	17	7, 15(a), 15(d), 17(b), 17(e)
5	2	22 (Test 1)	18(c), 22(b), 22(c), 22(i)
6	3	17	1(h), 4(d), 6, 8(a), 9(c)
7	3	32	20, 23, 30(a), 31(b), 32(c)
8	3	44	33(a), 36, 37, 39
9	4	18 (Test 2)	4, 6, 10, 12(c), 12(e)
10	4	32	19, 20, 23, 25(b), 26(a), 28(c)
11	4	42	33(c), 34, 40(d), 41(a)
12	4	49	43(a), 44, 45, 48
13	5	13	2, 3(c), 5, 7, 10(a), 13

CLASS TESTS AND EXAMS

Questions for the class tests in MATH1231 and MATH1241 will be similar to the questions marked [**R**] and [**H**] in the problem sets. Since each class test is only twenty minutes in length only shorter straight forward tests of theory and practice will be set. As a guide, see the recent past class test papers (at the end of the Calculus Notes). The Calculus class tests will take place in tutorials in the following weeks:

Test 1 Week 5

Test 2 Week 9

The tests will cover sections of the syllabus as shown in the table below. The test questions will be similar to the questions labelled by [R] and [H] in the Calculus Problems. The table shows which problems are relevant to each test.

Test	Syllabus sections	[R] and [H] problems in
1	Chapter 1 and up to chapter 2.3	Chapter 1 and Q1 - up to Q16 in chapter 2
2	Chapter 2.4 - 2.5 and all of chapter 3	Chapter 2, Q17 - Q22, and Q1 - Q44 in chapter 3

It is important to note that the class tests do not cover the whole syllabus.

Examination questions are, by their nature, different from short test questions. They may test a greater depth of understanding. The questions will be longer, and sections of the course not covered in the class tests will be examined. As a guide, see the recent past exam papers in the separate past exam papers booklet.

SCHEDULE OF ALL CLASS ASSESSMENTS

Lectures run during weeks 1–12 and tutorials run during weeks 2–13. The table below gives the schedule of online tests, class tests and computing assessments.

Week	Algebra	Calculus	Maple Computing
1			
2			
3			
4		TP1	
5		Test 1	Online tests 1 and 2 due
6	TP2, Test 1		
7			Online test ends
Mid-semester break			
8		TP3	
9		Test 2	
10			Test in Laboratory
11			
12	TP4, Test 2		
13			
End of semester examination — check UNSW exam timetables for details			

Examples of class tests are contained in the Algebra Notes and in the Calculus Notes.

TP1, TP2, etc denote the weeks when the online tutorial preparation tests are due for completion. The availability of these tests is given on page 11 and in Maple TA.

Borderline final marks in MATH1231 or MATH1241

If your provisional marks in MATH1231 or MATH1241 do NOT indicate a clear pass, and if this course is compulsory for your program and you wish to complete your degree in minimum time, you are advised to enrol **immediately** in summer session MATH1231, even if you expect to be granted additional assessment in the semester two course.

Provisional marks for MATH1231 and MATH1241 will be available late on Friday 21st November and summer session MATH1231 commences on Monday 24th November. Additional assessment results for semester 2 MATH1231 and MATH1241 will not be available until Monday 8th December, when it is too late to enrol in summer session MATH1231 (as one quarter of the course has already passed).

In summary, it is painless to withdraw from summer session MATH1231 (if you end up passing semester 2 MATH1231) but missing out on passing MATH1231 in summer can severely disrupt your degree program.

At the time of printing this booklet the HECS census date for summer session had not been set.

COMPUTING INFORMATION

How much?

In MATH1231/1241 there are online computing tests worth 4% of your final mark and **there will be a laboratory test, in week 10, worth 8% of your final mark**. Further, there will be exam questions worth at least another 3% of your final mark so in total 15% of your final mark is dervied from the computing component of the course. The Computing component depends on the other components and will require a knowledge of the appropriate Algebra and Calculus.

Aim

The aim of the Computing component is twofold.

- Firstly, you will use the Symbolic Computing Package called Maple to do some mathematics on the computer. This use of Maple is integrated with the Algebra and Calculus and is designed to enhance your understanding of the mathematics involved, as well as letting you use Maple as a tool to do the mathematics. You will find the skills you acquire and things you learn useful in many other subjects you study, both within and outside the School of Mathematics. Maple enables you to tackle larger, harder and more realistic mathematical problems as it can handle all the difficult algebra and calculus for you. Furthermore, learning some Maple introduces you to some of the basic ideas in computer programming.

- Secondly, you gain some familiarity with Linux, an operating system used widely in scientific computing.

Computing lab

The main computing laboratory for semester 2 is Room G012 of the Red Centre. You can get to this lab by entering the building through the main entrance to the School of Mathematics (on the Mezzanine Level) and then going down the stairs to the Ground Level. A second smaller lab is Room M020, on the mezzanine level of the Red Centre.

Accounts and passwords

If you had an account for computers in the Mathematics Labs in semester 1, you will continue to use the same account with the same password in semester 2. If you have forgotten your password you will need to set it again using the "Maths Info" link on the course homepage in My eLearning Vista. If you didn't have an account in semester 1 then a new Mathematics computing account (with user name z followed by your student number, as in z3198765) is automatically generated for you and all you need to do is set the password for this account. Again, you set your Mathematics computing account password using the "Maths Info" link on the course homepage in My eLearning Vista. This password is only used in the Mathematics Lab and for your online tests in Maple TA — your UniPass remains unchanged. If you have forgotten how to log in and use the lab computers help can be found in chapters 1–4 of the Computing Laboratories Information 2009 booklet and the School web site.

If you have problems with your account, you should go to Room M022 on the Mezzanine Level of the Red Centre between 1pm and 2pm on any weekday from Thursday of Week 1. You will need to show your student card.

WARNINGS

Misuse of computers is treated as Academic Misconduct and is a serious offence. Guidelines for acceptable conduct are in the Computing Notes.

The Mathematics Computer Labs will be heavily used this year as there are about 4000 students with accounts. Queues will develop at peak times such as when assignments (in other courses) or tests are due. Plan what you are going to do on the computer BEFORE you sit down at a PC — don't waste your time and other people's. Problems with your own (home) computer, internet service or the UNSW IT systems are not considered to be an excuse for missing tests or test deadlines. So you should PLAN AHEAD and not leave things until the last minute.

You should not use Maple to do your Algebra and Calculus tutorial problems (unless it is explicitly indicated) until you have understood the material thoroughly, as working through the problems is important for learning the material. Once the material is understood you can then use Maple to check your answers. You may also use Maple for other subjects.
It is academic misconduct to do other people's tests or to allow others to do your test.

Assessment

For both MATH1231 and MATH1241 there will be two different forms of computing tests. An initial set of four small tests will be run using Maple TA, a web based software application for online learning, teaching and assessment. Direct access to Maple TA is via the link

http://mapleta.elearning.unsw.edu.au/mapleta

where the login is zSTUDENTNO and the password is your mathematics computing lab password. These tests may be completed on any suitable web browser in your own time. These online Maple computing tests are linked to the self-paced Maple instruction modules in My eLearning. Details on using Maple TA for these tests are in the file "Instructions for use of Maple TA" in the folder

Course Materials > **Online Tests**

in My eLearning for your course. These online Maple computing tests will be available (almost) continuously, as they must be completed in sequence, but to gain marks for the computing component of the course the tests must be completed before the deadlines indicated below.

Tests	**Due**
1 and 2	5pm Friday of week 5 (21/8/2009)
3 and 4	5pm Friday of week 7 (4/9/2009)

The second form of computing test will be run under exam conditions in the School's laboratories. You must book for the test through the School's Student Web Portal, accessible via the Maths Info link on the course page on My eLearning, and bring your UNSW student ID card to the test.

All tests are linked to the Algebra and Calculus material, so you should make sure you understand the course work before trying them.

Due dates

The online Maple computing tests have deadlines of 5pm Friday of week 5 for the first 2 quizzes and 5pm Friday of week 7 for quizzes 3 and 4.
The laboratory test will be held at various times in week 10 (booking available from week 8).

Because the computing test can be sat at many different times, medical, or other, reasons for missing the test will generally not be accepted. For this reason you are advised to choose an early time to sit the test. If you consider that you have an exceptional reason for missing the test then you must speak to Dr Bates or Dr Blennerhassett at your earliest convenience after the tests have been completed. Tutors do not have permission to accept medicals for the computing test.

Teresa Bates (Room 6107)
Lecturer in Charge
First Year Computing

Details of the test follow in the next pages.

MATH1231/MATH1241 LABORATORY TEST

Tests will be held in the Red-Centre computer lab G012 at various times during Week 10.

You must make a booking to do the test at one of these times. Bookings must be made through the School of Mathematics and Statistics' Student Web Portal ("Maths Info" link on My eLearning). This should be available after week 8 of semester. When you have logged on, follow the appropriate link to get instructions about how to make a booking. If you believe that all the proposed times will be impossible for you, inform the First Year Office immediately.

The test will be on the features of Maple which are covered in Chapter 1 and Chapter 2 of the First Year Maple Notes 2009.

You will NOT need to remember the exact syntax of each command because you will be provided with a hard copy of the First Year Maple Notes in the test and you will also have access to an on-line copy of the Notes. However, you WILL need to practise for the test by working through the problems on the attached problem sheet. Don't just sit at home and work out commands which you think will work. It is essential that you try out your answers on the computer to check that they do work and to get practice at recognising and recovering from common mistakes such as omitting the colon in `:=` or forgetting to unassign a variable.

For each problem on the problem sheet, we have provided an answer which shows you what the final Maple output should be, but not the commands which you might use to get that answer. If you have difficulty doing one of these problems, ask for help from one of the computing consultants in the labs. **If your Maple worksheet crashes while you are working on the practice problems, please make a note of what you were doing at the time and inform one of the computing consultants.**

Note that **you will NOT be awarded any marks for a correct numerical or formula answer without appropriate Maple commands to generate that answer.** For example, if you are asked to differentiate x^2, the answer $2x$ will not get any marks unless it has been generated by an appropriate differentiation command. **Everything that can be done by typed Maple commands must be done by typed Maple commands.** For example, if you are asked to find the largest member of a set of integers then you must use a Maple command to find it — there will be no marks for looking at the set and picking out the largest member yourself. You must **never read a numerical value from one of Maple's output lines and type it back in as input to a later command**. You must use typed Maple commands and not the GUI (Graphical User Interface) functions such as menus obtained by right clicking on expressions. You should be able to 'run' all the commands in your worksheet by clicking the "!!!" button.

You will need to save your Maple worksheet before the end of the test, following the instructions on the test paper. However, you must **tidy up your worksheet as you go** by deleting mistakes and unsuccessful attempts, so that the worksheet you submit shows only your final attempt at each question. **Make sure that you know how to go back and change a wrong command, how to insert a new input line among existing input lines and how to delete unwanted lines.** Practise doing these things when working through the practice problems.

Note that the Maple worksheet you produce in the test will be printed before marking and **only the first 10 pages will be marked.** Any additional pages will be discarded.

Also attached is a sample test. Try to do it in 40 minutes AFTER you have worked through all the practice problems

You will NOT be allowed to take any calculators or writing materials (pens, pencils, paper) into the test.

PRACTICE PROBLEMS MATH1231/1241

All answers must be EXACT, unless the question asks for a certain number of significant figures.

1. Find $\lim_{n\to\infty} n^{-k}$ where k is a real number greater than 1. *A*nswer: 0

2. Find
$$\frac{\partial^2}{\partial x \partial y}\left(x^2 y^2 e^{x^2+y^2}\right)$$
and apply `factor` to your answer.

   *A*nswer: $4xye^{(x^2+y^2)}(1+y^2)(x^2+1)$

3. Let $\mathbf{u} \in \mathbb{R}^{15}$ be the vector whose kth component, for $k = 1, \ldots, 15$, is k^2 and $\mathbf{v} \in \mathbb{R}^{15}$ be the vector whose kth component, for $k = 1, \ldots, 15$, is k^3. Use the command `seq` to generate these vectors and then evaluate, to 3 significant figures, the vector which is the projection of $\mathbf{u}$ onto $\mathbf{v}$.

   *A*nswer: [.0754, .603, 2.04, 4.83, 9.43, 16.3, 25.9, 38.6, 55.0, 75.4, 100., $-$ 130., 166., 207., 255.]^T

   [Note: you can use the Maple command `interface(rtablesize=15);` to tell Maple to display the elements of vectors of length 15.]

4. Given the three points $A(1,2,3)$, $B(1,-3,5)$ and $C(0,2,4)$, let

   $L1$ be the line through A and B and
   $L2$ be the line through C parallel to $(1,0,-2)$ and
   $P1$ be the plane through A, B and C and
   $P2$ be the plane through A with normal $(3,0,-1)$.

   Using the `geom3d` package, or otherwise:

   (a) Find, in degrees to 4 significant figures, the angle between $L1$ and $L2$. *A*nswer: 70.60 *degrees*

   (b) Find the distance between $L1$ and $L2$. *A*nswer: $\frac{5}{129}\sqrt{129}$

   (c) Use the `Equation` command to find a cartesian equation for $P1$ with coordinate names x, y, z. *A*nswer: $24 - 5x - 2y - 5z = 0$

   (d) Find a parametric expression for the line $L1$. (You can do this also with the `Equation` command). *A*nswer: $[1, 2-5t, 3+2t]$

   (e) Find a normal to $P1$. *A*nswer: $[-5,-2,-5]$

   (f) Find, in radians to 4 significant figures, the angle between $L1$ and the line $L3$ which forms the intersection of $P1$ and $P2$. *A*nswer: .1312

5. Let $S1$ be the sphere $x^2+y^2+z^2 = 1$ and $S2$ be the sphere with center $(1,2,3)$ and radius 3. Let C be the circle of intersection of $S1$ and $S2$ and let T be the centre of C. Find the coordinates of T and the distance from T to the centre of $S2$.

   *A*nswer: $\left[\frac{3}{14}, \frac{3}{7}, \frac{9}{14}\right]$, $\frac{11}{14}\sqrt{1}4$

6. (a) Find a partial fraction expansion for

$$\frac{3x^5+2x^4+6x^3+7x^2+3x-8}{(x^2+1)^2(x^2-1)}.$$

Answer: $\frac{13}{8}\frac{1}{x-1}+\frac{11}{8}\frac{1}{x+1}+\frac{7}{4}\frac{1}{x^2+1}+\frac{13}{2}\frac{1}{(x^2+1)^2}$

(b) Use a Maple command to pick out the denominator of the third summand of the expansion in part (a). *Answer:* $4x^2+4$

7. (a) Find the solution $y(x)$ to the initial value problem

$$y'-xy-x^3y^2=0, \quad y(0)=1/3.$$

Answer: $y(x)=\dfrac{1}{2-x^2+e^{(-\frac{1}{2}x^2)}}$

(b) For the y in part (a), find the value of $y''(0)$ and apply `simplify` to your answer. [Hint: `dsolve` does not actually create an expression called y — its output is an equation, not an expression. You will have to create y yourself, either by using `assign(%)` or by using `rhs(%)` to pick out the expression on the right of the equation.] *Answer:* $\frac{1}{3}$

8. Find the solution $y(x)$ to the initial value problem

$$x^2y''-2xy'+2y=x, \quad y'(1)=y(1)=0.$$

Answer: $y(x)=x^2-x(\ln(x)+1)$

9. Find the general solution to the differential equation

$$y''+ky=0$$

when k is a negative real number.

Answer: $y(x)=\_C1\, e^{\sqrt{-k\sim}\,x}+\_C2\, e^{-\sqrt{-k\sim}\,x}$

10. Find the largest positive member of the set

$$\{\sin k \mid k\in\mathbb{Z},\ 1\le k\le 100\}.$$

Answer: sin(33)

11. Let $p(x)=1^2+2^2x+3^2x^2+4^2x^3+\ldots+21^2x^{20}$

and $q(x)=1^3+2^3x+3^3x^2+4^3x^3+\ldots+21^3x^{20}$.

Find the coefficient of x^{21} in the product $p(x)q(x)$. *Answer:* 2456124

12. Define an abstract function f which takes two vectors $\mathbf{u}$ and $\mathbf{v}$ as its arguments and computes the projection of $\mathbf{u}$ onto $\mathbf{v}$. Apply your function to the vectors $\mathbf{u}=(1,2,3)^T$ and $\mathbf{v}=(3,2,1)^T$.

Answer: $\left[\frac{15}{7},\frac{10}{7},\frac{5}{7}\right]^T$

13. Define an abstract function f such that $f(x) = \sinh^{-1}(\cos(e^x))$ and use the D operator to evaluate, to 10 significant figures, the derivative of f at $x = 0$. *A*nswer: $-.7403212721$

14. a) Maple does not have a command to compute the nullity of a matrix but it does have commands `ColumnDimension` and `Rank`. Use these to define an abstract function which computes the nullity of a matrix. Apply your function to the matrix

$$\begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{pmatrix}.$$

*A*nswer: 1.

b) *Without performing row operations*, find a basis for the kernel of

$$A = \begin{pmatrix} 1 & 2 & 3 & 4 \\ 5 & 6 & 7 & 8 \\ 9 & 10 & 11 & 12 \\ 13 & 14 & 15 & 16 \end{pmatrix}.$$

*A*nswer: $\{[2, -3, 0, 1]^T, [1, -2, 1, 0]^T\}$

15. Use `coeff` and `seq` to create an abstract function f such that if p is a polynomial expression of degree n in the variable x then $f(p, n)$ is the list of coefficients of p, arranged in increasing order. Apply f to the polynomial $5 + x + 4x^2 + 2x^3 + 3x^4$. *A*nswer: $[1, 2, 3, 4, 5]$

16. Define an abstract function s such that if k and n are positive integers then $s(k, n)$ is the kth member of the standard basis in $\mathbb{R}^n$. [Hint: The members of the standard basis in $\mathbb{R}^n$ are the columns of the $n \times n$ identity matrix, which can be created using the `IdentityMatrix` command from the `LinearAlgebra` package.]

17. Let $\mathbf{a}$ be the vector $(1, 2, 3)^T$ and $\mathbf{b}$ be the vector $(4, 5, 6)^T$. Define an abstract function such that if $\mathbf{x}$ is a vector in $\mathbb{R}^3$ then

$$f(\mathbf{x}) = (\mathbf{a} \cdot \mathbf{x})\,\mathbf{a} + (\mathbf{b} \cdot \mathbf{x})\,\mathbf{b}.$$

Find the matrix (with respect to the standard basis in $\mathbb{R}^3$) for this function $f : \mathbb{R}^3 \to \mathbb{R}^3$. [This can easily be done in one line using the function s from question 16.]

*A*nswer: $\begin{pmatrix} 17 & 22 & 27 \\ 22 & 29 & 36 \\ 27 & 36 & 45 \end{pmatrix}$.

18. Compare the results of applying the commands `ifactor`, `ifactors` and `factorset` (which is in the `numtheory` package) to the number 96. If you are not sure about what is happening here, look at the online help for these commands.

a) Find the sum of the squares of the first seven (in increasing order of magnitude) of the distinct prime factors of 1 035 981 870. *A*nswer: 1026

b) Let L be the result of applying `ifactors` to 425 217 100. Without reading a numerical value and typing it back in, assign to a variable n the value of the *exponent* of the third factor (in increasing order of magnitude) in the prime factorization of 425 217 100. *A*nswer: 5

19. Read the online help for the `add` and `mul` commands to find out how you can use these commands to add up or multiply the members of a set or list without having to know how many items there are in the set or list. (Look at the second dot point in the help entry and at the fourth and fifth command lines in the examples at the end of the entry.)

    Define an abstract function which calculates the sum of the squares of the distinct prime factors of a given integer. Apply your function to 1 035 981 870. *A*nswer: 3356

20. Use a `for` loop to display, for $k = 1, 2, \ldots, 10$, the sum of the first 15 terms of the series

$$\sum_{n=1}^{\infty} n^k.$$

    *A*nswer: 120, 1240, 14400, 178312, 2299200, 30482920, 412420800, 5666482312, 78800938560, 1106532668200

21. The Fibonacci numbers are defined by $a_0 = a_1 = 1$ and

$$a_k = a_{k-1} + a_{k-2} \quad k \geq 2.$$

    Enter the values for $a[0]$ and $a[1]$ and then use a `for...while` loop to find the largest Fibonacci number smaller than 100.
    Suppress printing out of values of $a[k]$ while the loop is running and just display the value of the relevant Fibonacci number after the loop has finished.
    *A*nswer: 89

22. A simple iteration procedure with $a_0 = 0$ and $a_{n+1} = \exp(-a_n)$ for $n \geq 0$ is being used to find an approximate solution to the equation $x = e^{-x}$. Use a `for...while` loop to find the first value of a_n such that $|a_n - a_{n-1}| < 10^{-5}$. Display this value of a_n to 10 significant figures. (See Computing Notes section 7.20.1 for a useful example.) *A*nswer: .5671407814

23. Write a procedure which takes an integer n as input and returns $n^2/9$ if n is divisible by 3 and $(n^2 - 1)/3$ if n is not divisible by 3. Do NOT use the command `piecewise`. (You can make use of the fact that n is divisible by 3 if and only if n `mod` $3 = 0$.) Apply your procedure to $n = 363$ and $n = 364$.
    *A*nswer: 14641, 44165

UNIVERSITY OF NEW SOUTH WALES
SCHOOL OF MATHEMATICS AND STATISTICS

MATH1231/MATH1241 COMPUTING TEST

SESSION 2, 2009 SAMPLE VERSION A

INSTRUCTIONS

- **No calculators, pens, paper or writing materials of any kind are permitted**, but you will be provided with a copy of the Computing Notes.
- Start up a Maple session and open the worksheet `test.mw` using the Open option on the File menu or the Open Worksheet Icon. This worksheet has been prepared with comments separating it into sections for each question. You will then be able to save your session just by clicking on the save icon. **Do not** change the input mode from "Text" to "Math".
- In case your Maple session crashes, you should **frequently save your work** during the test, **by clicking on the save icon**.
- You may attempt the questions in any order, but each question must be attempted at only one place in the record of your session, NOT in a number of places interspersed with attempts at other questions. Work which is not labelled with the appropriate question number may not be marked.
- You will not be awarded any marks for a correct numerical or formula answer unless you have used **appropriate typed Maple commands** to generate that answer. Everything that *can* be done by means of typed Maple commands *must* be done by means of typed Maple commands. In particular, do NOT read numerical values from output lines and type them back in as input, cut-and-paste output to input or use the graphical user interface features to produce output.
- **All answers should be EXACT**, unless the question asks you to find the answer to a certain number of significant figures.
- You must **tidy up your session** as you go by deleting mistakes and unsuccessful attempts, so that the session you submit shows only your final attempt at each question.
- **BEFORE THE END OF THE TEST** you must **print your session to a file** with the following steps.

  i) **Open** the `Print` window *either* by clicking on the printer icon in the tool bar of the Maple window *or* by selecting `Print` from the `File` menu.
  ii) **Tick** the "Print to File" box.
  iii) Click on the `Print` button at the bottom of the `Print` window.
  iv) **Click** on the `OK` button in the **Print to File** window

  You do NOT have to enter a file name or any other details in the `Print to File` window.
- Open the the file manager by clicking on the "home" icon (pictured to the right) and then click on the file "out.ps". This will open the printed version of your worksheet that will be marked. Check that this looks correct and is no more than 10 pages. **Only the first 10 printed pages will be marked.**

- At the end of the test you must **leave this test paper and the copy of the Computing Laboratories Information and First Year Maple Notes behind.**

The test questions are on the back of this sheet.

Time allowed: 40 minutes

1. *(3 marks)*
   Let

$$\begin{aligned} p(x) &= x + 2x^2 + 3x^3 + \ldots + 12x^{12}, \\ q(x) &= (1+x^2)(2+x^2)(3+x^2)\ldots(6+x^2). \end{aligned}$$

   Find a partial fraction expansion for $p(x)/q(x)$ and use a Maple command to extract the numerator of the 5th summand in the partial fraction expansion.

2. *(3 marks)*

   (a) Find the solution $y(x)$ to the initial value problem

$$y' - xy + xy^2 = 0, \quad y(0) = \frac{1}{2}\,.$$

   (b) For the function y in part (i), find the value of $y''(1)$ to 10 significant figures.

3. *(4 marks)*
   A simple iteration procedure with $a_0 = 1$ and

$$a_{n+1} = 2 + \ln a_n, \qquad n \geq 0,$$

   is being used to find an approximate solution to the equation $\ln x = x - 2$. Use a `for...while` loop to find the first value of a_n such that $|a_n - a_{n-1}| < 10^{-5}$. Display this value of a_n to 10 significant figures. Do NOT allow Maple to display any of the earlier values of a_n.
   [Don't forget that you need to use `evalf` in stating conditions and you will probably need to assign values to both $a[0]$ and $a[1]$ before starting your loop.]

4. *(4 marks)*
   Given the three points $A(1,2,3),\ B(-2,3,4),\ C(1,3,2)$,
   let

   - $L1$ be the line through A and B,
   - $P1$ be the plane through C with normal $(1,-2,1)$,
   - $P2$ be the plane whose equation is $x + y + z = 1$,
   - $L2$ be the line of intersection of $P1$ and $P2$.

   Using the `geom3d` package, or otherwise:

   (a) Find (in radians to 10 significant figures) the angle between $L1$ and $L2$.
   (b) Find distance between $L1$ and $L2$.

One mark will be awarded for any one correct relevant Maple command.

LEAVE THIS PAPER BEHIND WHEN YOU ARE FINISHED

STUDENT-OWNED COMPUTERS FOR MATHEMATICS COURSES

The School of Mathematics and Statistics is committed to providing, through its own laboratories, all the computing facilities which students need for courses taught by the School. No student should feel the need to buy their own computer in order to undertake any Mathematics course. Nevertheless, the following information is provided for the benefit of those who may wish to use their own computer for work associated with Mathematics courses.

All of our courses have a My eLearning Vista presence, and it is there you should look for course materials or links unless your lecturer tells you otherwise. My eLearning Vista may be accessed from any computer with internet access; see their help files and pages for technical requirements and how to check whether your web browser is supported. Some courses may also make use of Maple TA for testing. If you use your own computer to access this system, you should have an up to date browser and java plugin.

The School of Mathematics and Statistics provides assistance to students using teaching software in its laboratories. It does not have the resources to advise or assist students in the use of home computers or in communication between home computers and university facilities.

SOME GREEK CHARACTERS

Listed below are the Greek characters most commonly used in mathematics.

Name	Lower case	Upper case	**Name**	Lower case	Upper case
Alpha	α		Nu	ν	
Beta	β		Xi	ξ	
Gamma	γ	Γ	Pi	π	Π
Delta	δ	Δ	Rho	ρ	
Epsilon	ϵ		Sigma	σ	Σ
Zeta	ζ		Tau	τ	
Eta	η		Phi	φ or ϕ	Φ
Theta	θ	Θ	Chi	χ	
Kappa	κ		Psi	ψ	Ψ
Lambda	λ	Λ	Omega	ω	Ω
Mu	μ				