Mathematics 1110H – Calculus I: Limits, Derivatives, and Integrals
TRENT UNIVERSITY, Fall 2020

A very quick start with `Maple`

§**0 Introduction.** This handout is intended to give you just enough information to let you start learning `Maple` by yourself on Trent University's lab computers[1]. Note that all the versions of `Maple` from `10` on are pretty similar as far as the features used in this course are concerned. Please note that the University has a 50-seat license for Maple, so at most 50 students can use it simultaneously. You may, if you wish, buy a copy of the current version of `Maple` for yourself; it could well end up being useful in later years if you end up taking courses in the more mathematical sciences or in applied mathematics.

If you would rather not use `Maple` in MATH 1110H, you may use other software with similar capabilities, such as `Mathematica` (the leading commercial program) or `SageMath` (a free open-source program). Like `Maple`, `Mathematica` and `SageMath` are available for various [though not necessarily all] recent versions of Windows, Mac OS X, and Linux[2].

Keep in mind that `Maple`, like its competitors, is a very large, complex, and versatile piece of software. You are not likely to need more than a tiny fraction of its capabilities in this course or, for that matter, in your entire undergraduate career[3]. The downside is that all too often learning how to do even simple things is harder than one would like, one problem being that small mistakes often invoke advanced features of the language, making trouble-shooting very annoying.

§**1 The first time.** Do the following:

- Log into MyTrent, go to the "Services" tab, and then click on the "Remote Computer Access" link in the "IT Services" section.
- Click on the "General Lab" icon.
- Provide your Trent e-mail username and password at the login window. [Yes, with the same credentials you used to log into MyTrent.]
- You should now have a Windows screen in your browser window. Go to the *Maple 17* sub-menu of the *Start* menu button in the lower left-hand corner, and choose the item *Maple 17*. [Yes, this item and the sub-menu it is in have the same name.]
- Once `Maple` has started up, choose the item *Take a Tour of Maple* from either the *Help* menu, or one of the similar items from, if `Maple` displays one or both, the *Quick Help* or *Startup* windows. Maple Tour will offer you several options; you should, at the very least, choose and go through the *Ten Minute Tour. Numeric and Symbolic Computations* is also one that is very likely to prove useful later on.

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[1] Formerly distributed in various publicly accessible places on campus ... Nowadays accessible via your browser, as described later.

[2] A substantial fraction of what `Mathematica` can do is exposed for free on WolframAlpha (`www.wolframalpha.com`). `SageMath`, the most comprehensive open-source alternative to both programs, can be downloaded and used for free (`www.sagemath.org`), although it is not as slick as either of its commercial rivals.

[3] Your humble author has a Ph.D. in mathematics and has never used more than a tiny fraction of what `Maple` can do either ...

§**2 Help and references.** `Maple` has extensive help and information resources built in, accessible via its *Help* menu and, in some cases, from the *Quick Help* window. The following items in the *Help* menu are likely to be of particular use to beginners:

- *Maple Help* – lets you search the help system.
- *Take a Tour of Maple* – lets you take one of the tours showing off various features. The two you should definitely check out are:
  - *Ten Minute Tour* [recommended above]
  - *Numeric and Symbolic Computations*
- *Manuals, Resources, and more* – provides access to a lot of information, including:
  - *Applications and Examples* – some of which may be of interest.
  - *Manuals* – lets you access `Maples`'s *User Manual*, among other references.
  - *Using the Help System* – which is potentially self-referential . . . :-)

§**3** `Maple` **documents.** You can create a new document in the default "document mode" by typing *Control–N* or by selecting the option *Document Mode* under *New* in the *File* menu. (This is the mode described in the *Ten Minute Tour*.) This mode is convenient for using the various tools in the bar on the left side of the window, as well as the keyboard, to help assemble expressions and formulas and then manipulate them.

You can also create new documents in "worksheet mode" by selecting the option *Worksheet Mode* under *New* in the *File* menu. This mode is more convenient for typing expressions, formulas, and commands using just the keyboard. It is not as easy to use as the document mode, at least initially, but it is **much** easier to troubleshoot when something unexpected happens, and it is usually faster to use, once you've mastered it. Please note that solutions to the `Maple`-based parts of the assignments will be given in worksheet mode, since it is easier to reproduce and for others to modify for themselves. (Feel free to look through the solutions to the assignments from previous years to see how things work!)

As with other programs `Maple` has options under the *File* menu for saving documents. You may wish to save your documents somewhere you can later revisit them – not all assignments will be conveniently doable in one sitting. **Be warned** that saving documents on a remote desktop somewhere where you can retrieve and use them later does not always seem to be straightforward. (Copying them from the remote computer and pasting them to your local computer does not seem to work for your instructor, for example, though it should theoretically work with the access to the local clipboard enabled for the remote computer.) In the worst case, you should be able to email them to yourself from the remote computer.

§**4 Further reading.** Besides `Maple`'s own resources, the following[4] are very likely to be useful for `Maple` beginners and will be posted to Blackboard as well the course archive page:

0. The lecture *Introduction to Maple*, which can be found at:
   `euclid.trentu.ca/math/sb/1110H/Fall-2020`
   `/1110H-A-2020-10-30-maple.mp4` (video)
   `/1110H-A-2020-10-30-maple.mw` (worksheet)
   `/1110H-A-2020-10-30-maple.pdf` (pdf)
1. *Getting started with Maple 10*, by Gilberto E. Urroz (2005), which can found (pdf) at: `euclid.trentu.ca/math/sb/1110H/Fall-2020/GettingStartedMaple10.pdf`
2. *A survey of mathematical applications using Maple 10*, by Gilberto E. Urroz (2005), which can found at:
   `euclid.trentu.ca/math/sb/1110H/Fall-2020/MathematicsSurveyMaple10.pdf`
   and `euclid.trentu.ca/math/sb/1110H/Fall-2020/MathSurveyMaple10.mw` respectively.

§**5 Getting help.** Besides the various resources noted above, you can get help in learning to use `Maple` by working with others on the assignments: team efforts usually overcome `Maple`'s learning curve a little faster. (Just remember the "work together, write up separately" rule for the assignments, as given on the course outline.) Your OLSA can probably help you with the annoyances of remote access to the lab computers running `Maple`. Finally, your instructor also knows a little bit about the use of `Maple` in this course, so feel free to use the office hours as necessary!

[4] Thanks to Prof. Urroz for permission to use these documents!