GAwxM version 2.4 (and 3.2) for Windows

The mathematical code was developed from the web-based, published paper,
A Survey of Geometric Algebra and Geometric Calculus

GAwxM version 2.4

...and examples from Projective Geometry and Space-time Algebra were coded using the GAwxM extrinsic functions specifically for Geometric Algebra (GA).

GAwxM version 3.2

...and although topics for General Relativity have been included within the GAwxM environment, this work does not use the GA functions. There is some clarification of the use of the intrinsic ctensor package for cosmological models. Work supporting the online article *Transforms for the early Kerr metric* was also included where a novel, non-rotating metric was found as an alternative to the Schwarzschild metric.

Setup for GAwxM version 2.4 to 3.2

This should clarify the setup sequence under the Windows operating system. The best environment is a standalone machine (not connected to the web) with an early version of Windows e.g.an old laptop with a Pentium cpu under Windows 98.

Development of GAwxM started in 2012 under Ubuntu 12.04 LTS (LifeTime Support) using wxMaxima 12.04.0 and the project is now being documented with the readme files under Windows. These earlier combinations of operating systems and CAS were quite adequate (and preferable) to later versions.

How to set up a development system under Windows

Installation of wxMaxima

https://sourceforge.net/projects/maxima/files/Maxima-Windows/

Select an early version and download the zip file to the Desktop.

https://sourceforge.net/projects/maxima/files/Maxima-Windows/5.24.0-Windows/

If it has an extension...tar.gz then install 7-zip and extract the folder to the Desktop.
Search for wxMaxima.exe and create a shortcut. Try to run wxMaxima and it may say that it cannot find the maxima.exe computation engine.

Copy the maxima.bat file to the Desktop and rename to maxima.batch to be able to edit with Wordpad. Edit the path in file, maxima.batch as required. Save and exit and rename again to maxima.bat, then overwrite the original.

In order to prevent early problems with maxima it is best to follow these

specific (modified) tasks taken from the maxima readme file (see also DEP comments) ...

Modify the Environment for a Specific MS-DOS Program

To increase the default environment space just for maxima.bat, follow these steps:

1. Right-click the maxima.bat program icon, and then click Properties. (First locate the file in the folder named D:/maximaold/bin/ or wherever it was installed. This is easier on earlier versions of Windows)

2. Click the Memory tab.

3. In the Initial Environment box, type the number of kilobytes (4096) that the program requires, and then click OK.

Download of GAwxM

Download the repository using the *Code* button or the *Latest* release button

https://github.com/stephenathel/gawxm

For later versions of Windows that allow several different Users...

Extract into your own user folder C:/Users/< your user folder > to create... C:/Users/< your user folder >/GAwxM/ alongside the other extracted files.

For earlier single-user versions of Windows...

Extract into a user created folder e.g. C:/Maxima_user to retrieve... C:/Maxima_user/GAwxM/ alongside the other extracted files.

Either way, make a copy of folder /GAwxM/ as a backup e.g. /GAwxM_bak/.

The other extracted files may include a self-extracting, executable, installation file (typically 32 Mbytes). If it has been allowed, the executable will be named, maxima-version.exe.

Otherwise, download a self-extracting, executable, installation file from Sourceforge. It should be from a similar generation as that above, e.g. maxima-5.28.0-2.exe, if one can still be found. The executable maxima-version.exe file will include the wxMaxima (notebook) interface.

The maxima-version.exe file should be moved to its own program folder for extraction and installation. For earlier versions of Windows the folder could even be on another drive, e.g. D:/maximaold/.

Configuration of wxMaxima

Later versions of wxMaxima had altered defaults that made the input more interactive...

and less useful for the execution of the active documents of GAwxM...

Start wxMaxima...

Select the Edit tab and the Configure tab at the bottom;

For later versions of wxMaxima...Select Worksheet and then...
untick all of:
    Intelligently hide cell brackets
    Enter evaluates cells
    Open a cell when Maxima expects input
    Use centered dot character for multiplication
    Insert % before an operator at the beginning of a cell;
select (ensure ticked):
    Keep % sign with special symbols:%e, %i, etc.

For earlier versions of wxMaxima...Select Options and then...
untick all of:
    Show long expressions
    Use centered dot character for multiplication
    Enter evaluates cells
    Open a cell when Maxima expects input;
select (ensure ticked):
    Keep % sign with special symbols:%e, %i, etc.

OK the ticked selections and quit wxMaxima.

Installation of GAwxM - User path definition

Examine the exported output held in the folder named .../GAwxM_setup/ and named setup_maxima-init.pdf

It is easier to read this pdf document and understand the user path definition rather than stumble on, not knowing why your installation either works or fails. When you are ready, the wxMaxima document that generated the exported output can be run as below.

Start wxMaxima...

open.../GAwxM_setup/setup_maxima-init.wxm

GAwxM version 2.4

run.../GAwxM_setup/setup_maxima-init.wxm

This used to be just Ctrl-R

GAwxM version 3.2

run.../GAwxM_setup/setup_maxima-init.wxm

Now we need to find the Cell tab next to the Edit tab on the main wxMaxima toolbar menu and 'Evaluate all cells' with the cursor and mouse!

A few manual iterations of the running of this file may be needed until it is clear that the user path definition is working and that the installation is complete.

Workflow

After a first read of this document and its detailed Installation sequence then a decision must be made to expend the effort. To encourage the reader to proceed there are sample output files showing both some basic functions and some more significant results. Each output was produced by running one of the documents in the source folder .../GAwxM/. The result of a run is a screen view of the source document with the mathematical results embedded in the relevant input cells. Now when the File tab and Export tab were selected this allowed the screen view to be saved to the folder named .../GAwxM_pdfs/ (within the appropriate sub-folder.) Each result was exported as a pair of files; the html and an image file for the embedded results. The html was then converted to a pdf within the Opera browser.

All this allows the student of Geometric Algebra to make his decision while searching the web for resources. The files within a Github project may be browsed before ever downloading anything. After a download, the html files can be browsed at leisure before deciding on an installation.

If an installation is succesful then it is best to have a backup of the source .../GAwxM/ as e.g. .../GAwxM_bak/ and to set all sub-folders and contents of .../GAwxM/ to read-only. Then a non-read-only folder can be created elsewhere for practice on copies of the source documents (after changing them to non-read-only). Alternatively, the non-read-only folder, .../GAwxM_user/ may be used.

N.B. After an edit or a run of a document within a sub-folder of ../GAwxM/, an asterix appears with a prompt to save, and that should be refused for the source sub-folder documents themselves in case they happen to be non-read-only.