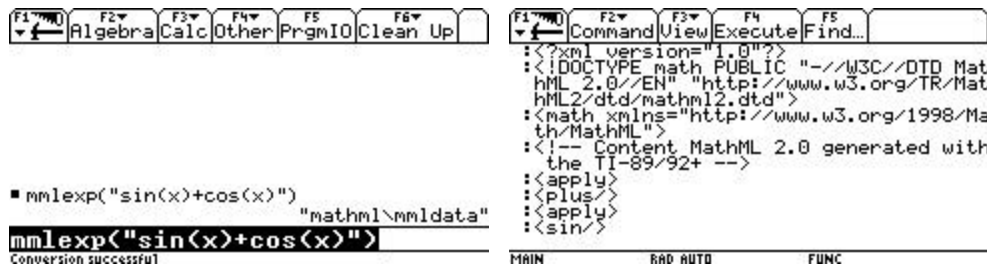# *TIMathML*[†]

MathML import/export for the TI-89/92+
Version 1.01
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MathML v2.0 is a standard specification by the W3C for representing mathematical expressions. Members of the Math Working Group include Wolfram Research, Design Science, IBM, Adobe, Microsoft, and the American Mathematical Society. It is based on the popular XML, and has several advantages over traditional methods of mathematics communication:

- It can be rendered in any web browser that has adequate stylesheet support. Currently, several vendors such as IBM and Design Science offer plug-ins to render MathML in web browsers, and both Internet Explorer and Netscape plan to support MathML.
- Expressions and subexpressions can be copied and pasted (imported) into a computer algebra system such as Mathematica or the TI-89/92+ for evaluation, and the results can be posted back to the Web.
- Voice synthesis software can use the semantics of MathML to render math expressions (math can be accessible to the visually impaired).
- MathML can encode both presentation (notation) and content (semantic) information. Content MathML uses default notation.

This package currently does only export of TI-89/92+ expressions to content MathML, but I plan to add a program for importing MathML as well. Thanks to E.W. for his help with this program.

[†] TI is a licensed trademark of Texas Instruments Inc. All other trademarks are the property of their owners.

Usage:

1. In the home screen, evaluate: MMLExp(expression-string[, textvar])
   The textvar argument is optional.
   For example: MMLExp("sin(x)+cos(x)") or MMLExp("x^2", "mathml\powtest")
2. The program will write to the mathml\mmldata text variable (or the specified variable). The variable's contents, if any, will be overwritten. Any errors will be shown in the text variable, and the last error will be shown in the status bar.
3. Transfer the text variable to a computer via GraphLink (if the conversion was successful).
4. Open the text variable in a text editor. On Windows, try Wordpad instead of Notepad for better line-break formatting.
5. Delete the first three lines and the last line. What remains is the generated MathML. You can now embed it in XHTML code, keep it as a standalone MathML (**.mml**) file, or paste the part `<math>...</math>` into a computer algebra system like Mathematica®.

Format for standalone MathML file:

```
<?xml version="1.0"?>
<!DOCTYPE math PUBLIC "-//W3C//DTD MathML 2.0 //EN"
"http://www.w3.org/TR/MathML2/dtd/mathml2.dtd">
<math xmlns="http://www.w3.org/1998/Math/MathML">
...
</math>
```

How to embed MathML into XHTML:

```
<?xml version="1.0"?>
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.1 plus MathML 2.0//EN"
"http://www.w3.org/TR/MathML2/dtd/xhtml-math11-f.dtd">
<html xmlns="http://www.w3.org/1999/xhtml">
<body>
<p>
<math>...</math>
</p>
</body>
</html>
```

What's New:

- Added XML header information (DTD specification etc.)
- Added an optional argument for specifying the text variable to use
- Program now returns the name of the text variable if conversion was successful, and undef otherwise
- Program no longer tries to open the text variable
- Changed vector conversion so that column vectors are called <vector>
- <fn> has been deprecated, so it was removed
- Added statistics tags
- Added support for basic 1/sin=csc, 1/cos=sec, 1/tan=cot, but this won't recognize, for example, $(1/\sin(x))^2$ as $\csc(x)^2$
- Added <inverse> tag for matrix^{-1}

- The floating point number 0.57721566490153 is translated to
- Added <cn type=…> attributes
- Variables containing Greek characters are now exported correctly (Unicode)

Major things remaining to be implemented:
- Add <cn type="complex-cartesian"> attribute for complex numbers
- Piecewise-defined functions (WHEN_TAG)
- Trig tags (csch/sech/coth and their inverses) with improved support for csc/sec/cot
- Hex and Bin (ExtTags) – for other (unsupported) ExtTags, maybe use error format TagsVal:ExtTagsVal
- Support export of variables with accented characters
- Generating MathML from a text variable, including both text and expressions (using control characters to distinguish them)
- Build tag dictionary (may scrap it if it increases filesize)
- Exporting presentation MathML (using "boxed RPN" information from AMS)
- Importing content MathML

More examples:
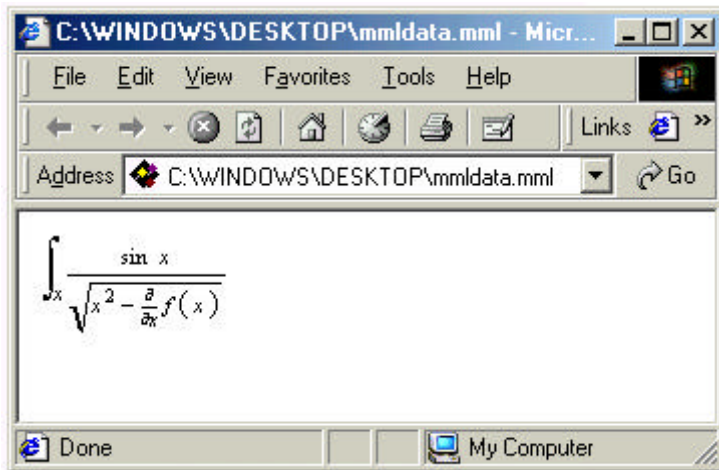

When pasted into Mathematica® 4.1, MathML looks like this:
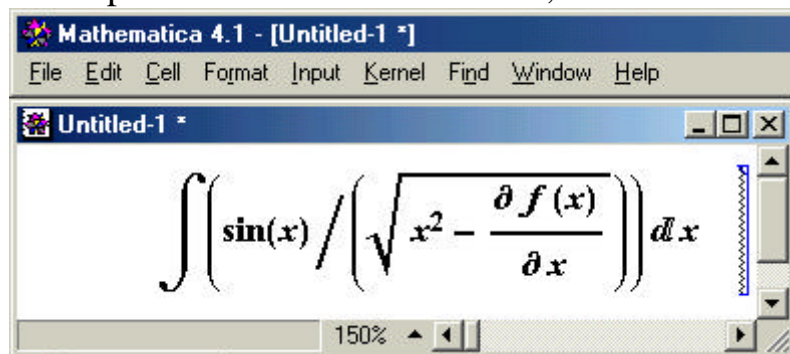
Here is what MathML currently looks like in IBM's techexplorer[®]:

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