

Quatro for amsmath LaTeX users

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Preface

tldr; For LaTeX users wanting complex math in both html and PDF: 1) Don't mix Quarto equation and amsmath syntax. Stick with amsmath. 2) Add a mathjax.html file and add to your top yaml to turn-on equation numbering and only use LaTeX equation environments (not \$). 2) For referencing, only use \label{} and \eqref{} or \ref{}. Do not use (#eq-) and @eq- for cross-refs. Pandoc (and MathJax) knows LaTeX so all your fancy equations should work if you do 1 and 2.

These are notes for those creating a Quarto book that they want to display and html and PDF formats. Those only needing Word format, sorry not sure that works as of July 2023; I have not tested since then.

To do

- Adding equations that look like 3.1 so with the chapter numbering. We need this in Quarto books. MathJax [tagformat](#) looks like the way to go.
- Going forward, I think we might need a lua filter for LaTeX docs. Perhaps this already exists? Like, we should have to re-write a basic LaTeX doc that has `\section{abs}`. We should be able to include our LaTeX chapters (`chap1.tex`) directly in the Quarto books and have standard LaTeX code with R or Python code mixed in.

Contributing!

Please put in a pull request and add more examples. Also Quarto keeps updating so these notes will get out of date. I used Quarto 1.5.55 and output from `pandoc --version` is

pandoc 2.19

Compiled with pandoc-types 1.22.2, texmath 0.12.5.2, skylighting 0.13,
citeproc 0.8.0.1, ipynb 0.2, hslua 2.2.1

Scripting engine: Lua 5.4

1 Background

The default way to number and cross-ref equation numbers in Quarto is a `$$` fence with `{#eq-}`:

```
$$  
S_n = \frac{X_1 + X_2 + \cdots + X_n}{n}  
      = \frac{1}{n} \sum_{i=1}^n X_i  
$$ {#eq-eq1}
```

$$S_n = \frac{X_1 + X_2 + \cdots + X_n}{n} = \frac{1}{n} \sum_{i=1}^n X_i \quad (1.1)$$

Then you cross-ref with `@eq-eq1` which gives you this: Equation 1.1. It works great with single equation in display math...and it causes all sorts of problems for LaTeX users.

The problem with this for LaTeX users is that if you are a LaTeX user then you are using (almost certainly) `amsmath` and the more complex equation environments and equation numbers. That Quarto syntax above is not LaTeX and going to break things for you on many levels (Pandoc, mathjax) for things that expect proper `amsmath` syntax. Also you do not want to be re-writting your LaTeX equation code for 100s of equations from your LaTeX docs!!

Rather than try to get Quarto syntax to work with your AMS equation environments, I suggest never mixing Quarto syntax and `amsmath` syntax. **Only** use proper `amsmath` syntax. So no `$$` fencing around your `\begin{<environment>}` stuff. That `$$` fencing is improper syntax and using it, while seemingly a shortcut to get what you need, is going to make you suffer later.

2 yaml for your Quarto book

MathJax is handling the display of your equations in html and you need to set the configuration to show numbers. Oddly, that is not the default. So you need `include-in-header: mathjax.html` in your Quarto book yaml. See the mathjax tab for your `mathjax.html` code.

This is what a minimal `_quarto.yaml` for numbered equations looks like

```
project:
  type: book

book:
  title: "Quatro for amsmath LaTeX users"
  chapters:
    - index.qmd
    - yaml.qmd
    - numbered_equations.qmd

format:
  html:
    include-in-header: mathjax.html
  pdf: default
# Don't use this. Breaks numbering (Aug 2024)
#   html-math-method:
#     method: mathjax
#     url: "https://mathjax.rstudio.com/latest/MathJax.js?config=TeX-AMS-MML_HTMLorMML"
```

August 2024: I don't know why that url is not working. It was in Jan 2024. It is just setting the MathJax version. Probably the url is out of date somehow.

3 Numbered equations

Reminder: Do not use [Quarto equation numbering syntax](#). Stay with proper amsmath LaTeX. Quarto syntax is fine if you only have single equations in display math, but you are on this page because that is not what you need. You need the full amsmath capabilities.

Yes, the equations don't have 3.1, 3.2 like they should in html output even though they are fine in PDF. Still trying to figure out how to get the Quarto chapter variable over to MathJax tagformat extension which can add the chapter labels.

3.1 Basic align

```
\begin{align}
a &= b + c \label{eq2} \\
c &= d + e \label{eq3}
\end{align}
```

$$a = b + c \tag{3.1}$$

$$c = d + e \tag{3.2}$$

The cross-ref with `\eqref{eq2}` and `\eqref{eq3}` to get [\(3.1\)](#) and [\(3.2\)](#).