Converting LaTeX to Sage Worksheets
aka `tex2sws`

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Goals

- Convert *existing*, book-length documents
- Integrate Sage instruction with mathematical instruction, in both directions (a two-way street)
- Worksheets typographically comparable to a printed book
- Live Sage compute cells
- Place for students to experiment, add annotations

LaTeX Source

- "Standard" LaTeX source
- Formatting needs to reflect web target
- Experience: fairly easy to "clean up" other's LaTeX

tex4ht Conversion

- tex4ht - existing tool to convert LaTeX to various formats
- XHTML target, web (HTML), with structure (XML)
- jsmath target, *lingua franca* of Sage notebook
- Very powerful, uses tex executables
- Very finicky, use with care
- 95% of the work happens here

Custom Conversion

- tex2sws - a Python script
- And an asssociated tex4ht configuration file
- Recognizes a subset of SageTEX
- Cooperates with SageTEX output, plots, etc
- Read tex4ht jsmath output
  - ▶ Chop headers and footers
  - ▶ Parse as valid XML
  - ▶ Write back with Sage notebook formatting (non-standard)

Output

- A single *.sws file
- Or, a zip file full of *.sws files
- Use notebook "Upload" function
- Sectioning, Table of Contents all present
- Mathematics (LaTeX) present via jsmath (scalable fonts!)
- Sage input (optionally output) present and live
- Doctest-able file when expected output provided (reliability)

DEMONSTRATION

Source

- An amazing variety of TEX packages supported
- But must think less of printed page, think more of web
- For example, following goes nowhere

  `\hspace{3.5in}`
- tex4ht easily fooled:

  `\text{for $x\in T,\,\text{for all $T$ closed}}$}`
- Even parentheses *in running text* must be balanced
- May include SageTEX magic
- Demo: source from Chris Godsil, U of Waterloo

pdflatex

- Optional step
- Can produce PDF version from same source
- Demo: necessary for SageTEX processing
- Demo: builds a doctestable file

tex4ht

- Pros: Only converter to use TEX executables
- Cons: Archaic usage, author is deceased
- Demo: custom configuration file, note SageTEX environments
- Demo: output (yikes!), note CSS, note sections
- Demo: note tex4ht oddities

tex2sws

- Demo: sws creation, zip creation
- Demo: Upload into a notebook

tex2sws

- Functional
- Needs polish
- Needs an "Author's Guide"
- Acknowledgement: Robert Marik has been very helpful

Projects

- Poster Child: Judson's *Abstract Algebra*, 100%
- Current: RAB's *First Course in Linear Algebra*, 80%
- Last Summer: French *Sage Book* - 8 authors
  "gained valuable experience"
- This Summer: Stein's *Elementary Number Theory*
  one trial run, in good shape
- Critical: Stein's *Sage for Power Users* - 0%
- Godsil's Sage primer for algebraic graph theory - very new (to me)
- Karl-Dieter Crisman's number theory text - skunkworks
- Several single worksheets for presentations (Victoria, Waterloo)

An Experiment

- Demo: Godsil's CSS/XHTML/MathJax by hand
- Demo: drop it into a Sage worksheet

Forward-Looking Statements

In United States business law, a forward-looking statement is a statement that cannot sustain itself as merely a historical fact. A forward-looking statement predicts, projects, or uses future events as expectations or possibilities. –Wikipedia

- Is a PDF version of a "Sage book" important? Necessary? Silly?
- Will tex4ht ever target MathJax?
  (Or are we stuck with jsmath-compatibility?)
- What about e-books, tablets and mathematics? EPUB format?
- Should new works be authored another way?
  CSS/XHTML/MathJax? Docbook with MathJax? ReST?

Talk: http://buzzard.ups.edu/talks.html

Conversion Software: https://bitbucket.org/rbeezer/tex2sws/

Experiments: http://wiki.sagemath.org/devel/LatexToWorksheet