QSS20: Modern Statistical Computing

Unit 05: LaTeX and catchup (GitHub & functions)

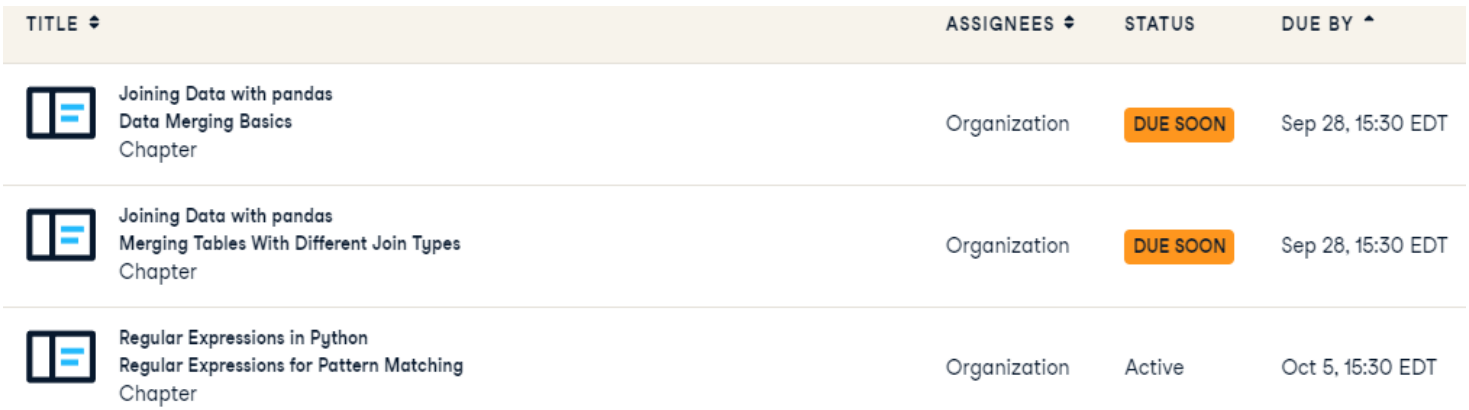
Goals for today

- **Project & assignment updates**
- Git/GitHub: lecture & activity, review pset2 submission instructions (from previous class)
- User-defined functions: lecture & activity (from last week)
- LaTeX/Overleaf

Where we're headed

DataCamp deadlines:

- **Wednesday 09/26:** Chapters on exact matching
- **Wednesday 10/05:** Chapter on regular expressions for matching



TITLE	ASSIGNEES	STATUS	DUE BY
Joining Data with pandas Data Merging Basics Chapter	Organization	DUE SOON	Sep 28, 15:30 EDT
Joining Data with pandas Merging Tables With Different Join Types Chapter	Organization	DUE SOON	Sep 28, 15:30 EDT
Regular Expressions in Python Regular Expressions for Pattern Matching Chapter	Organization	Active	Oct 5, 15:30 EDT

Class and problem sets:

- **This Wednesday & next week in class:** exact merging, regular expressions, probabilistic merging
- **Grades for pset1:** if you submitted on time, hopefully next Monday
- **Sunday 10/09 at 11:59 PM:** problem set two due

More about START model (for SIP)

- SIP data dictionaries now available for START Information Reporting System (SIRS) and soon for medical student training data
- You can read the START SIP proposal here
- From website of National Center of START Services:

  The START Model was developed and implemented in 1988 by Dr. Joan B. Beasley and her team to provide community-based crisis intervention for individuals with intellectual and developmental disabilities and mental health needs. The model is evidence-informed and utilizes a national database. It is a person-centered, solutions-focused approach that employs positive psychology and other evidence-based practices. **START** *stands for* **S***ystemic,* **T***herapeutic,* **A***ssessment,* **R***esources, and* **T***reatment.*

Final project surveys

- Thanks to those of you that filled it out!
- **Extension for final project survey: due Sunday, 10/02 (then we'll put you in groups)**
- If you've formed a team already, feel free to get started on final project milestones (first one *not due until 10/21*)

Note on difficulty of activities/psets vs. DataCamp

1. **DataCamp**: meant as gentle intro before pset challenges; not realistic for entry-level data science jobs; provides a lot of handholding in terms of noting (1) exactly which commands to use; (2) helper code; (3) very simplified/cleaned data
2. **Real-world data science:** more difficult than the problem set; would be asked "hey, did this policy reduce or widen disparities" and start with a blank notebook and be 100% reliant on google/stackoverflow
   - **Translating question into concrete approach:** define disparities (charges, incarceration or not, sentencing conditional on incarceration); find which variables measure that; deal with duplicates
   - **Data cleaning without scaffolding:** recognizing the errors in the datetime and that `errors_coerce = True` would set a lot of valuable data to missing; further deduplication of judge names; investigating `PROMIS CONVERSION` (eg coding that to missing)
   - A lot of these things won't throw errors if you run an analysis without fixing but will lead to flawed results/incorrect policy conclusions

Before we code, let's group!

Groups for today are same as pset1:

Partner A	Partner B	Partner C
Max Konzerowsky	Omario Corral-Williams	
Anish Sikhinam	Justin Sapun	
Emma Johnson	Nate Haile	
Andrew Cho	Luca D'Ambrosio	
Saige Gitlin	Daniel Céspedes	Giulio Frey
Nick Romans	Kayla Hamann	
Daniel Xu	Filippo de Min	
Andy Ilie	Rachael Williams	

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Overview before activity

- LaTeX: typesetting language
- Can work with locally using things like TexMaker, etc.
- Here, we'll be interacting with it via Overleaf, which is similar to Google docs but for LaTeX and facilitates collaboration/easier troubleshooting of compile errors

Non-exhaustive list of things that can cause compilation errors

1. Underscores or certain special characteristics without an "escape" before them, e.g.:

```
## Ex. 1: this causes error due to underscore without escape
The file is called: file_here.R
## works
The file is called: file\_here.R

## Ex. 2: comments out rest of code after percent symbol
This increased by 5%
## this works
This increased by 5\%
```

2. Start entering math mode but fail to exit it, e.g.:

```
## Ex. 3: this causes errors
We calculate fraction as $\dfrac{5}{10} and then do...
## this works
We calculate fraction as $\dfrac{5}{10}$ and then do
```

“Environments”, or ways to go beyond standard text

- Itemized list

```
\begin{itemize}
\item First item...
\item
\end{itemize}
```

- Numbered list

```
\begin{enumerate}
\item First item...
\item
\end{enumerate}
```

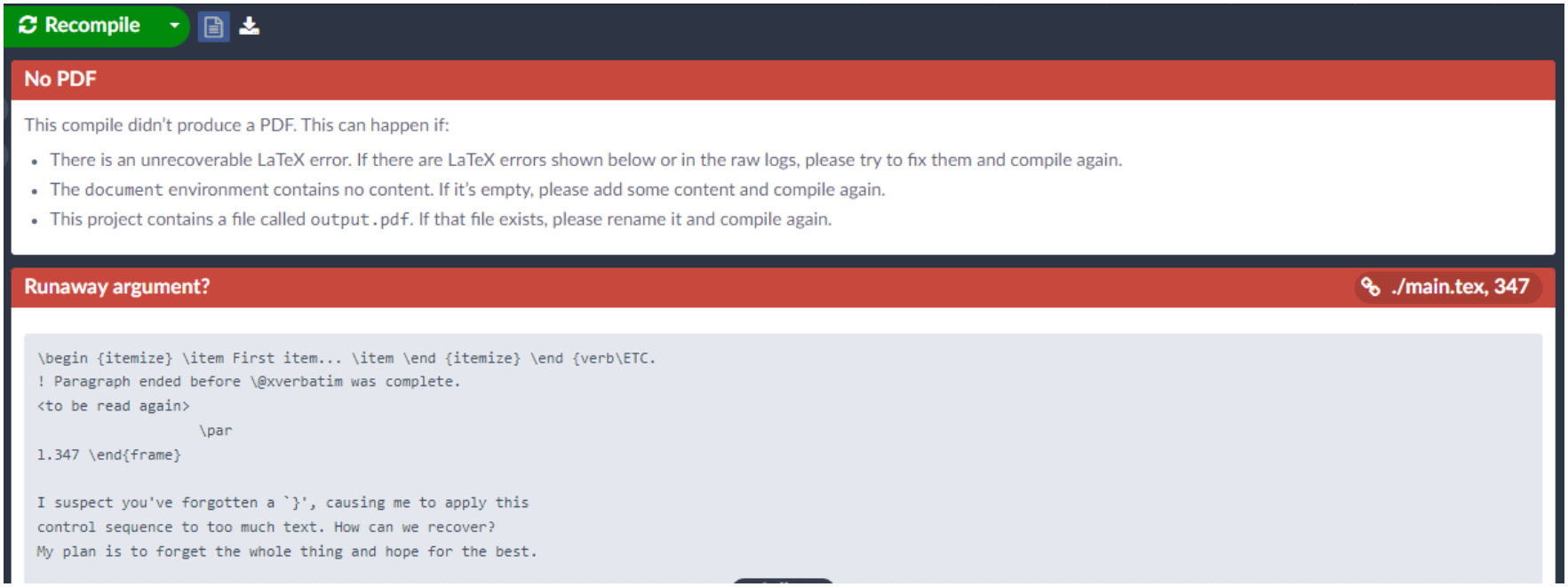
- Figure

```
\begin{figure}
\caption{my caption}
\label{fig:myfig}
\includegraphics[scale = 0.5]{example_graphic.png}
\end{figure}
```

Leads to another set of compilation errors

- Runaway argument or forgotten end group
- Usually means you began an environment but forgot to end it; can happen with long tables, deeply nested lists, etc. where easy to lose track

Example:



Compilation errors

- Common w/ complicated docs
- Ways to address:
  1. **Recompile frequently!**
  2. Try to interpret and google the error–not always easy since error messages may not be clear/informative w.r.t. line numbers (esp. on Overleaf)

Other useful commands

```
## create a numbered section and label it to cross-ref
\section{This is my section outlining disparities}
\label{sec:disparities}

## reference a section in text
In Section \ref{sec:disparities} I discuss...

## reference a table or fig in text
Table \ref{tab:tabname} and Figure \ref{fig:myfig} show...

## stop a figure or table from going into the next section
[! h] (inside \figure{} env; stay where it is in code)
\FloatBarrier (before \& after figure/table; don't float off)
(in addition to stuff at the start of the \begin{table})
```

Break for LaTeX tables and figures activity

- Link to template to copy over (click ‘Menu‘ in top-left then Actions/‘Copy Project‘)
- Link to Python activity:

`03_latex_output_examples_blank.ipynb`