NOTEBOOK EXERCISES

EXERCISE 0: INSTALL JUPYTER

Install jupyter. First, you need an installation of python/pip:

- https://www.python.org/downloads/

Then, install jupyter following https://jupyter.org/install:

```
pip install jupyterlab
jupyter lab
```

To use `R`, run these commands in an `R` session

```
install.packages("devtools")
devtools::install_github("IRkernel/IRkernel")
IRkernel::installspec()
```

Alternatively, you can use the interactive web-apps

- https://jupyter.org/try
- https://colab.research.google.com/

EXERCISE 1: ADD MARKDOWN TO A JUPYTER NOTEBOOK

Load up jupyter and start a new notebook `.ipynb` file.

In several different cells add markdown and render it. Your markdown should include:

- a heading, bold and italic text, a numbered and un-numbered list of items
- displayed pseudo`code`
- a link to an external webpage, an image
- embedded math in LaTeX

After writing these blocks of markdown, re-arrange them

- copy and past one
- delete one
- move one

EXERCISE 2: ADD SOME CODE

Add some code to your notebook file. Here, we'll use the palmer penguins data set. You can download it and load it up with

```
install.packages("palmerpenguins")
library('palmerpenguins')
head('palmerpenguins')
```

Explore this data:

- make a histogram of flipper length for each species
- add some markdown commentary to your plots
- install `plotly` via `install.packages('plotly')` and then add an interactive scatter plot:

```
p <- plot_ly(x = ____, y = ____,
  mode = "markers", type = "scatter")
embed_notebook(p)
```

EXERCISE 3: EXPORTING

Export your notebook to:

- `html`, then inspect the interactive html
- a `.R` script, then try running the script separately

Install jupytext via

```
pip install jupytext
```

Mirror your notebook into

- an `.R` script,
- a `.md` markdown file

Open up the .R script and edit it. Go back and re-load the `.ipynb` jupyter notebook and observe the changes.

EXERCISE 4: PUTTING IT ALL TOGETHER

1. Load up the `plates.csv` data from Bray et al. You can download it here.
2. Using `jupyter`, conduct some exploratory analysis.

- A good example of an exploratory analysis is to conduct PCA on the data and visualize the first several principal components, coloring the data using the metadata. Some data-cleaning might be in order.
- Make sure to document your code and use the markdown text to write comments on the analysis.
    1. Export your analysis as a HTML document using jupyter.
    2. Using `jupytext`, mirror the analysis to a `.R` script.
        - Run the script independently after exporting to it.