**Exercise: Reproducibility with Git & GitHub**

1. Adding a new file to the remote repository on Github
   1. Open the R project you created.
   2. Make sure that the RMarkdown file you prepared is saved in the local working directory. (It is not yet necessary to “knit” the Rmd file. But when you knit, RStudio automatically saves the Rmd file.)
   3. In RStudio, click on the “Git” tab in the top right panel
   4. Click on “Commit”. A new window should open.
   5. In the top left panel of the new window, you see the file you added. Click on the empty check box in the “Staged” column. Now you have added the new file to the **staging area**.
   6. Write a commit message in the top right window. This is just a brief comment to tell your collaborators and future you of why you made this change to the repository. In this case, you could write “add analysis script” or something similar.
   7. Click “**Commit**”. A little terminal window should open and tell you if the commit was successful. You can close the window.   
      Now you have added the change to the local repository on your computer (now git has made a new version of your project on your computer, and you could go back in time to work with the previous version).
   8. Push the change to the remote repository on GitHub by clicking on the green “**Push**” arrow in the top right of the staging window. A little terminal window should open and tell you whether pushing was successful. You can close this window.
   9. If you haven’t done so already, knit your Rmd file. Depending on how you set up the file, this will create an html or PDF document. You should see this new file appear in the Git panel at the top right of the RStudio window.
   10. **Stage, commit, and push** the new html or PDF file: Once again, click on “commit” in the Git panel. Tick the checkbox next to the file to **stage** it. Write a short commit message and **commit** the change. Now **push** the change to the remote repository.
   11. Go to the Github web page of your repository. Can you see the new file? Can you see your commit message?
2. Changing a file
   1. Make a small change to your analysis script. E.g., add one line with some text or comment, or make a tiny change to an existing line of code or text (change/add/remove one word or letter). Save the file. See that the file has now appeared in the “Git” tab of top right panel in the RStudio window.
   2. Knit the changed Rmd file. Now the updated html or PDF file should also appear in the Git panel.
   3. Once again, click on the “commit” button. Can you see how the change you made to the Rmd file is highlighted in the staging window?
   4. Stage the changed Rmd file and changed html or PDF by checking the “staged” boxes in the top left panel. Write another commit message and commit the changes.
   5. Push the changes to the remote repository.
3. Reproducibility check

Get together with one or two classmates and try to reproduce each other’s analysis:

* 1. Make sure your Github repository is **public** (caution: only if everything you have in there is indeed safe to make public!). Exchange repository links with your partner for this exercise.
  2. **Fork** your partner’s repository: On the Github page of the repository, click “Fork” at the top right. Confirm by clicking on “Create fork”.
  3. Now you have an independent copy of the repository on your own account. This **fork** is not directly connected to the original repository: If you change anything in your fork, it will not lead to a change in the original repository. If you want to use a fork to suggest changes to the original repository (e.g., you found a bug, play around with the code until you found a good solution, and want to offer the solution to the authors of the original code), this is possible via **pull requests** (we will not cover this part today though).
  4. Download the forked repository to your computer.
     1. In RStudio: File 🡪 New Project… 🡪 Version Control 🡪 Git
     2. Enter the repository URL of the forked repository (e.g., <https://github.com/amscheel/statistical_inferences>) and click “Create project”
  5. In the bottom right panel in RStudio, you should now see all files that are in the repository. Click on the RMarkdown file that contains your partner’s analysis.
  6. Knit the Rmd file. Can you knit the file without problems?
  7. Compare the knitted output with the analysis output of your partner: Are the analysis results in your output identical to theirs?  
     **If yes:** Congratulations! You have successfully reproduced your partner’s analysis.  
     **If no**: Try to find out what caused the difference and fix the problem.