

# Data Analysis in Astronomy and Physics (SoSe22)

Instructor: PD Dr. Markus Röllig  
TA: Dr. Christof Buchbender  
TA: Craig Yanitski

## Exercise Set 9

Due: **9:30 13 June 2022**

Discussion: **13:00 17 June 2022**

**Online submission** at via ILIAS in the directory Exercises / Übungen -> Submission of Exercises / Rückgabe des Übungsblätter

Data analysis and code development is typically done in larger collaborations. The most common way to do this is with a cloud service such as GitHub. `git` is a common method used for version control. You can find a descriptions of the various capabilities for example at Atlassian.

It is recommended that you register on GitHub to get used to it. For the remainder of the course, you may keep your solutions on GitHub and simply send a link to the necessary folder as the ILIAS submission (for example in an ascii file). If you choose to do so, the requirements for a submission remain the same (submit a self-contained pdf) and additional requirements that your repository is called `DataAnalysis` and the exercise solutions are placed in directories `exercise_x/` (so for exercise 9 it would be `exercise_9/`).

### 1. Regression - Fitting a line [data exercise] [50 Points]

In this problem we will fit a linear function  $f(x) = y_0 + \beta_0 x$  to the data from datafile: `line_data.dat`.

**a)** Perform the linear regression to fit a linear function  $f(x) = y_0 + \beta_0 x$  and plot  $f(x)$  together with the data points. **25 Points**

**b)** Compute the residuals and plot them. What is  $R^2$ ? **25 Points**

### 2. Model fit quality assessment [50 Points]

In this problem you will assess the quality of a fit by inspecting the residuals of the fit. For each of the following plots state whether the residuals indicate a reasonable model fit and briefly explain your conclusion and if applicable how possibly to improve the fit. **50 Points**

