**Tutorial 1**

**Task 1**

Please look at the following GeoGebra environment: [https://www. geogebra.org/m/aggzeusu](https://www.geogebra.org/m/aggzeusu)

*Ein Bild, das Diagramm enthält.

Automatisch generierte Beschreibung*

1. By changing the values of a and b on the sliders, check whether the given curve is an exponential curve, i.e. whether the red graph of approximately coincides with it.
2. If this is not possible in its entirety: up to what date?
3. Work on the illustrated tasks above (only 1 and 2) using GeoGebra (possible in the browser) and document your results.
4. Explain the didactic potential for modelling with data in this task.
5. Name one didactic advantage and one disadvantage of using GeoGebra for this task.

**Task 2**

Imagine, together with your grade-10 students, you would like to investigate how climate-friendly electric cars are. After a first research, your students present the following statistics[[1]](#footnote-1):

*Ein Bild, das Diagramm enthält.

Automatisch generierte Beschreibung*

*Ein Bild, das Diagramm enthält.

Automatisch generierte Beschreibung*

You compare the results together with your students in the plenary. A discussion breaks out among the students which statistic comes to the right or wrong conclusion.

1. Classify the situation with regard to the three stages of data analysis from the lecture. Explain how you would deal with this situation. Use the modelling cycle as an orientation.
2. Discuss the potential of this task in relation to ESD - Education for Sustainable Development - in mathematics lessons. Which of the target areas of the Orientation Framework for Global Development can be connected to here?

**Homework 1**

**Task 1**

Please look at the following GeoGebra environment: [www.geogebra.org/m/wyygzeec](http://www.geogebra.org/m/wyygzeec)

*Ein Bild, das Diagramm enthält.

Automatisch generierte Beschreibung*

Insect mortality due to climate change?

In the table below and in the adjacent coordinate system you can see data on the insect population in freshwater areas of a protected nature reserve in Germany from 1970 to 2010 (original data from Baranov et al., 2020).

In order to be able to make the most meaningful forecasts possible for the future of the vital insect population, the data can be modelled with a function.

Work suggestion 1

Use the different types of functions suggested by clicking on the checkbox. Use the sliders that appear to adjust your function parameters so that the function passes through the points as well as possible. Enter your final function equations.

Work suggestion 2

Look at the different functions in the lower, long-term section. What predictions for the insect population would you come to in each case? Justify your observations along the different function equations.

1. Work on the illustrated tasks above (only 1 and 2) using GeoGebra (possible in the browser) and document your results.
2. Explain the didactic potential for modelling with data in this task.
3. Name one didactic advantage and one disadvantage of using GeoGebra for this task.

**Task 2**

Imagine, together with your grade-10 students, you would like to investigate the climate impact of different foods. After a first research, your students present the following statistics:

*Ein Bild, das Diagramm enthält.

Automatisch generierte Beschreibung*

*Ein Bild, das Diagramm enthält.

Automatisch generierte Beschreibung*

*Ein Bild, das Diagramm enthält.

Automatisch generierte Beschreibung*

You compare the results together with your students in the plenary. A discussion breaks out among the students which statistic comes to the right or wrong conclusion.

1. Explain how you would deal with this situation. Use the modelling cycle as an example.
2. Discuss the potential of this task in relation to ESD - Education for Sustainable Development - in mathematics lessons. Which of the target areas of the Orientation Framework for Global Development can be connected to here?
3. Explain whether, you could later use such tasks that you have learned about in this lecture and the exercises in your teaching. What speaks in favour of this from your personal perspective? What is against it? Write at least five sentences.

# *Note: This sub-task c) will not be assessed in terms of content.*

**Tutorial 2**

**Task 1**

Consider the following statements about correlations. For which would you assume a negative correlation, for which a positive correlation?

* The more storks there are, the more births there are.
* The fewer storks there are, the fewer births there are.
* The more people live in the city, the fewer storks there are.
* The more storks there are, the more people live in the countryside.

Industrialisation in the 19th century led to more and more people moving to the cities. As more cities were built and there was less open space, the population of storks, among others, declined. Which of the following statements correctly describes this situation?

* There is a positive correlation between people in cities and storks.
* There is a negative correlation between the people in the cities and the storks.
* There is a positive correlation between people in the countryside and the storks.

Discuss which ambiguities can be found in the fictitious solution to another homework on correlations:

*The positive correlation of storks and birth rates can be attributed to industrialisation (case 3: a third variable z influences x and y). There are fewer storks in industrial areas and more people live in rural areas.*

Discuss what other factors can influence the relationship between rural or urban residence and birth rate.

**Task 2**

On the following page you will find texcerpts from the newspaper article from Günther Voss*“Zweifel an Hartz-Zahlen” (Doubts about Hartz figures)* from the Bonner Generalanzeiger (a German newspaper) of 27.01.2012. It was translated from German by the authors.

*Note: “Hartz IV” stands for the financial support that long-term unemployed persons in Germany received to cover their basic living.*

1. Look at the following exerpt about a statement formulated by Ursula von der Leyen, the former Federal Minister of Labour and Social Affairs and critically analyse the diagram presented in the newspaper article: What is being presented and in what form? What central message is being conveyed?

*“Child poverty is falling”, says the Federal Minister of Labour – and is pleased with the figures from the Federal Employment Agency in Nürnberg. They show a significant decrease in the number of children in the Hartz IV system. In Semptember 2006, 1.9 millien children under the age of 15 were still receiving Hartz IV supports; exactly five years later, the figure was just under 1.64 million – a decrease about 257.000 or 13.5 per cent.”*

*Ein Bild, das Text, Zeitung, Screenshot enthält.

Automatisch generierte Beschreibung*

1. Now look at the excerpt about the statement of Heinz Hilgers, President of the Child Protection League. Which central statement is to be conveyed here?

*The German Child Protection League (“Deutscher Kinderschutzbund”) reacted with particular suspicion to the success figures that became known yesterday. It expressed massive doubts about them. “Since 2006 there are almost 750000 fewer children under 15 in our country. So if there are fewer and fewer children, it is not surprise that in absolute number there are also fewer and fewer children living on soial supports”, said Child Protection League President Heinz Hilgers. And in the same breath he made a completely different calculation: The number of children living on Hartz IV fell by only 1.5 per cent between Semptember 2006 and 2011. In 2006, 16.6 per cen of Children under the age of 15 were in need of support, whereas now the figure is 15.1 per cent. The Child Protection League therefore considers the decline in child poverty to be greatly exaggerated.*

1. Use the official statistics of the Federal Statistical Office on the population of under-15s in Germany for the years 2001 to 2011, which are attached in Appendix A, to answer the following questions:
   * How has the population group of under 15-year-olds in Germany developed?
   * How has the proportion of under-15s in Hartz IV changed?

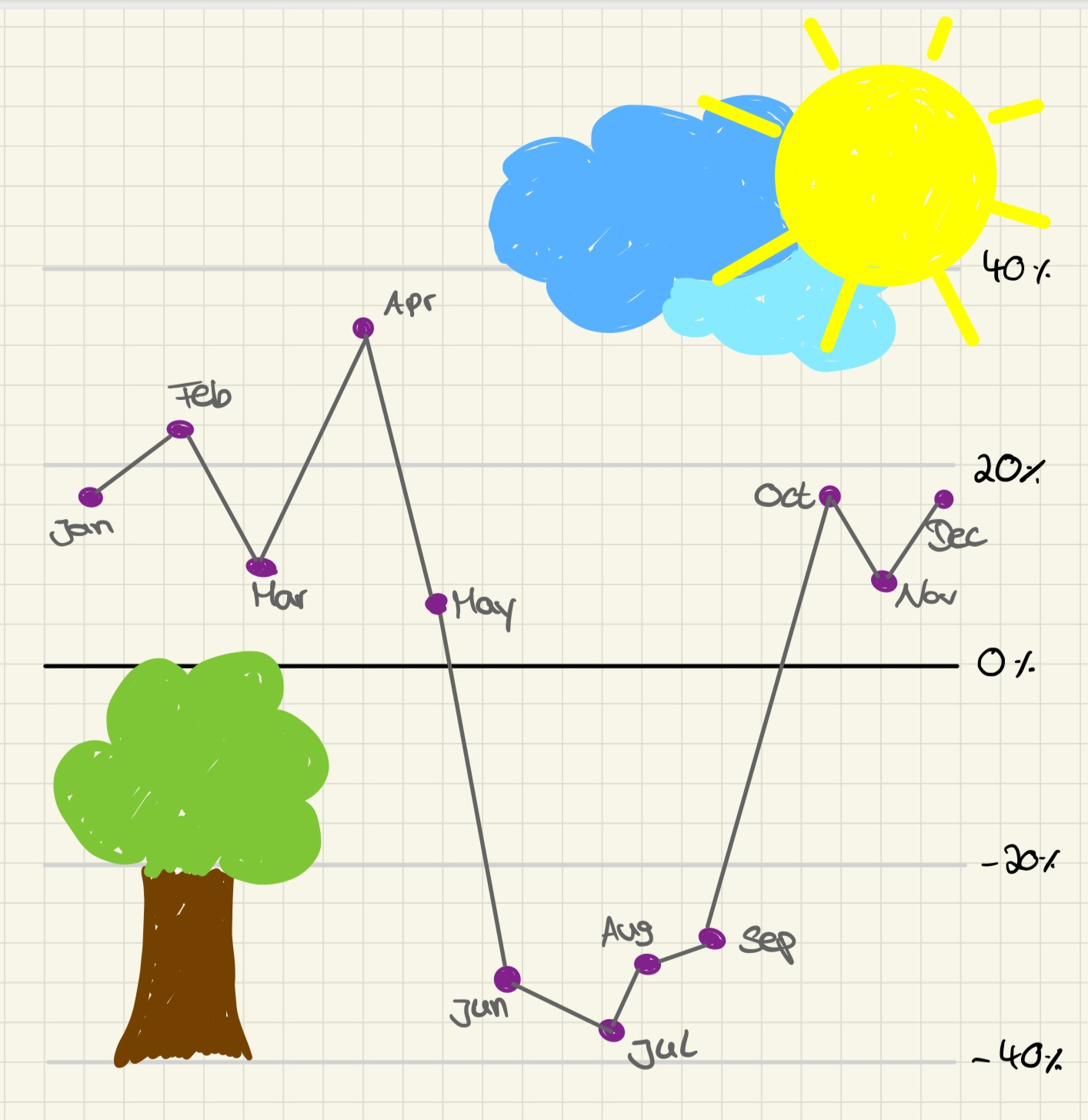
Produce suitable diagrams to support your findings. Do your results support von der Leyen's or Hilger's statement?

1. Specify the components of basic statistical education (according to Gal) in relation to the processing carried out in a-c.

**Homework 2**

**Task 1**

Below you can find a chart based on data from the magazine “*bahnmobil*” from April 2018. It is part of the series “*Understanding Germany with the help of Instagram*”, where data on the number of photos posted to selected hashtags on Instagram are analysed graphically. The original chart is illustrated with a men walking his dog in the forest, but was removed due to copyright.



**Let's go outside!**

April is the best month to get outdoors. To loosen the winter-stiff limbs and get used to the colours of nature again. That's how users on Instagram feel about it. After all, no other month of the year has more people posting photos of their #walk (black line: annual average). It's healthy - and also good for your Instagram feed.

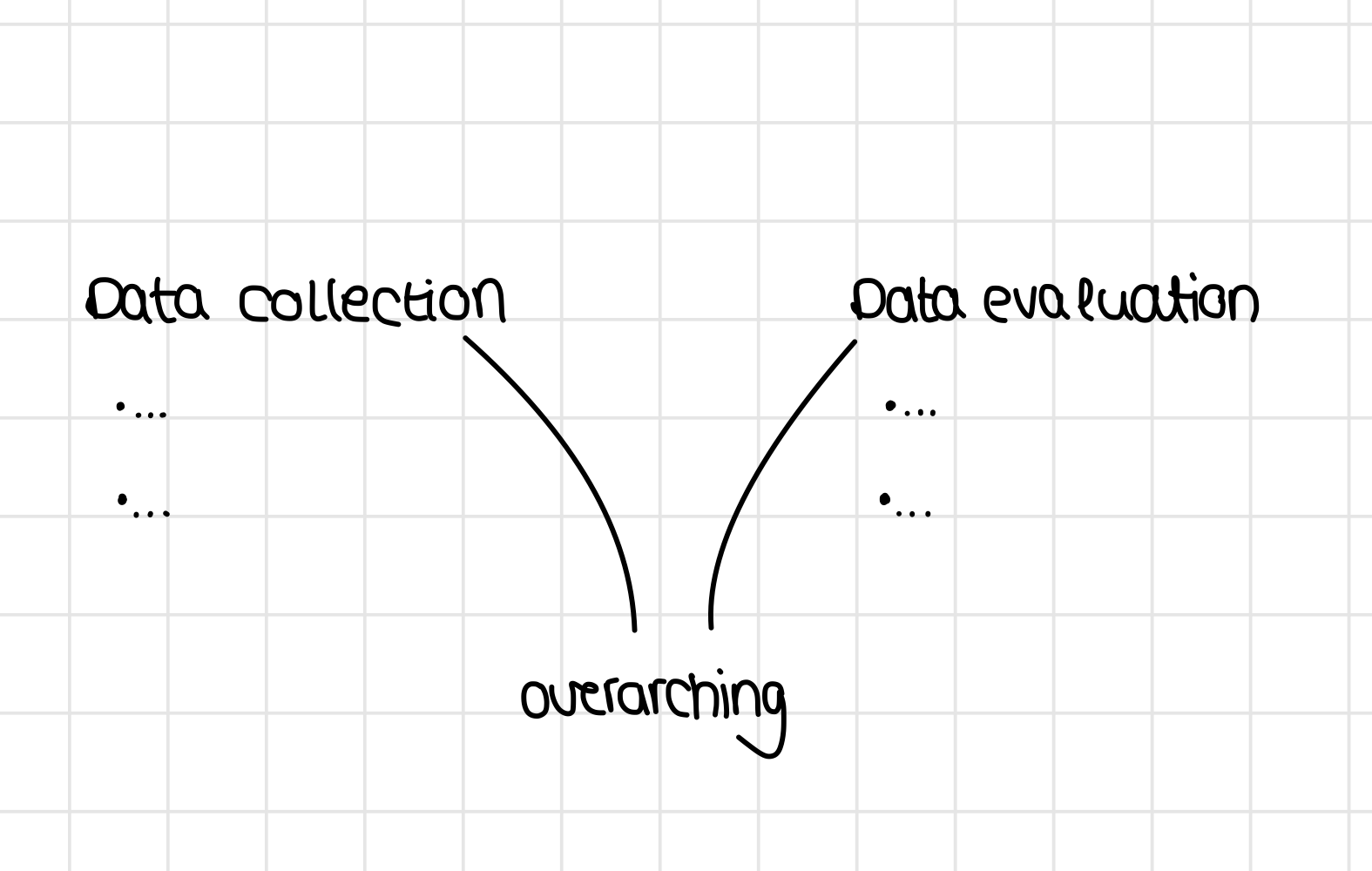
1. Check the statistical information contained in the diagram according to the checklist presented in the lecture. Consider the appropriate suggestions for questions in each case. (Of course, you may also add suitable critical questions yourself).
2. On the basis of your results from a), explain two reasons why the diagram *“Let's go outside!”* is suitable for use in stochastic lessons in grades 9/10 with the aim of promoting basic statistical literacy. Refer to the components of basic statistical literacy according to Gal.

**Task 2**

In the last weeks, we have mainly dealt with the area of descriptive statistics. The aim of this task is for you to generate a structured overview of what has been covered.

For this purpose, use the mind map you have started and expand it according to your wishes, if necessary. Then classify the following terms: (You are of course welcome to add further terms).

*Characteristic, absolute frequency, quartiles, range, classification, histogram, Standard deviation, Median, Modal value, Frequency distribution, Arithmetic mean, relative frequency, boxplot, variance, mean absolute deviation, research question, read the data, read between the data, read beyond the data, critical statistical literacy, mathematical modelling, normative modelling*

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1. Buchal, B., Karl, H.-D. & Sinn, H.W. (2019). Kohlemotoren, Windmotoren und Dieselmotoren: Was zeigt die CO2-Bilanz? *ifo Schnelldienst 8/2019*.

   Hoekstra, A. & Steinbuch, M. (2020). *Vergleich von lebenslangen Treibhausgasemissionen von Elektroautos mit den Emissionen von Fahrzeugen mit Benzin- oder Dieselmotoren.* Eindhoven: University of Technologie.

   [↑](#footnote-ref-1)