Features of a good exercise problem answer

Ability for systematic problem solving is very important because it eases solving challenging problems and improves academic skills that are needed, for example, in master's thesis and work life. Writing a detailed solution is a very strong thinking tool because ideas become explicit. A logical answer is also easier to follow, and it shows that the student masters the topic related to the problem.

- If applicable, sketch a figure of the situation, mark the used variables, dimensions, vectors etc. into the figure. This makes it easier to piece together the situation.
- Give a source of information, especially if it is other than the course book. This is important for the confirmation of the information. The equations of the course book can be directly cited using the number, for example, (2.14).
- Apply a validated methodology – i.e., mathematical model, computer simulation, measurement, statistical analysis, optimization technique, analysis based on examples, comparison with a known/existing/valid result, qualitative analysis (survey, interview etc.).
- Justify/explain the applied methodology physically and explain how it relates to the given problem using your own words. Find out in which section of the course book (or other source) this information can be found.
- Explain the new/unknown variables and give their units. This helps you to master the scope of the problem and makes possible to follow the answer.
    - E.g.. V^+ = voltage of a signal propagating to positive z direction, unit V.
- Make your solution to proceed systematically and explain the main principles even though they have not been explicitly asked so that it becomes evident how the final stage of the answer has been reached. This eases your thinking when the ideas are explicitly written down.
- Write all the essential intermediate phases of the methodology clearly so that one can follow the answer. Mention and justify assumptions used.
- If a numeric final answer is asked, the solution must present which formula and initial numeric values have been used and that the formula gives the correct unit. For instance, substitute the numerical values to the equation with the units or make sure that it is otherwise evident which numerical values have been used. SI unit inspection will reveal if the unit of the final numeric answer is wrong.
- Give the final answer using the same number of significant digits as the most inaccurate initial value but use more significant digits in the intermediate phases.
    - E.g., if the initial numeric value is a physical quantity, e.g., voltage V = 1.0 V (two significant digits!), give the final answer also using two significant digits, too. This is because the physical, measurable value is not fully accurate.
- When applicable, ponder using your own words does your final answer make sense. Justify the answer based on physical understanding. Typical problems of this course have a simplified connection to the real world. It is recommended to use common sense, too!
- **Lastly: problems are not always easy, but at least show that you try to do your best and you are willing to learn. Ask help in Zulip anytime.**

Grading criteria of the exercise answers

Each exercise problem is graded using the scale of 0-3 points.

- 3 points = "**Very good**": Both the written answer and the oral explanation prove that the student masters the topic of the problem very good. It is evident from the written answer how the final stage has been reached. The oral explanation is solid and plausible.
    - Symbols are explained, units are used correctly, and the numeric answer is given with suitable number of significant digits.
    - 3 p may also be granted even though the original answer contains some shortcoming, but the student is able to notice the reason and after the correction proves very good command.
- 2 points = "**Emerging**": Both the written answer and the oral explanation prove that the student has emerged knowledge and skills regarding the topic of the problem. However, the answer or explanation contains **some shortcoming,** and **it could still be improved**, for instance,
    - there is an unexplained mistake, but the basic principles are mainly valid,
    - the intermediate steps are partly missing, or the explanation is somewhat narrow or vague, it is not fully evident how the final stage has been reached, units are missing, symbols are not explained, wrong number of significant digits in the final answer.
    - a part of the answer (e.g., 1/3) is missing.
- 1 point = "**Modest**": Both the written answer and the oral explanation show that there is still room for significant improvement. The answer and/or explanation contains **significant shortcomings**, for instance,
    - there is a significant mistake, but some good features have been presented,
    - essential intermediate steps or all written explanations are lacking, it is impossible to follow the answer,
    - a significant part of the answer (e.g., 1/2 … 2/3) is missing.
- 0 points = **"No-good piece of work"**: There is a fatal mistake, totally wrong principles applied, more than 2/3 of the answer is lacking, or the answer has been copy-pasted.