

Diskrete Mathematik HS2026 — Prof. Dennis HOFHEINZ

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Exercise sheet 0

This is the exercise sheet number 0. The difficulty of the questions and exercises are rated from very easy (★) to hard (★★★★). The graded exercise is Exercise 0.1. If your interview is in the week of the **21.09.2026**, please prepare this exercise for the interview. The solution to this exercise must be your own work, you may not share your solutions with anyone else. See also the note on dishonest behavior on the Moodle page.

This exercise was designed for the mock interview held during the third lecture by the Head TAs of this course. The purpose of the mock interview is for you to know how the interviews will look like. You do not have to solve this exercise and you will not have an interview about this exercise.

Exercise 0.1 Mock Interview Exercise — INTERVIEW QUESTION (6 points)

This exercise will be discussed during the interviews in the week of the 21.09.2026

1. (2 points) (★)

Let us recall some definitions about propositional logic.

(a) (1 point) What is a formula of propositional logic?

(b) (1 point) Let F and G be formulas of propositional logic. What does $F \models G$ mean? How would you show it?

2. (2 points) (★)

We define a new logical operator $\diamond$ as follows:

A	B	$A \diamond B$
0	0	0
0	1	1
1	0	1
1	1	0

(a) (1 point) Compute the function table of

$$F = ((A \diamond B) \wedge A) \vee B$$

(b) (1 point) Can you simplify the formula above using your function table? The resulting formula should contain only the logical operators $\wedge, \vee, \neg$.

3. (2 points) (★★)

Define a new logical operator $\heartsuit$ such that the following formula is a tautology:

$$((B \rightarrow A) \rightarrow \neg(A \heartsuit B)) \wedge (A \vee \neg B \vee (A \heartsuit B)).$$

Exercise 0.1 will be discussed during the interviews next week.