

Full name:

Student number:

Study program:

Test Exam
December, 19th 2018
Geodatenbanken (Database module)
im WiSe 2018/19

**(Modul Geodatenbanken Master UI,
Teil des Moduls Geodatenbanken und Visualisierung Master GuG,
Teil des Moduls Angewandte Geoinformatik im Master UPIÖ)**

- You have **40 minutes** to answer all questions on the exam. There are 40 regular points and 5 bonus points. You need to get at least 20 points (in total) to pass.
- The exam consists in 3 exercises; there are 6 sheets of paper.
- No aids are authorized.
- Please write your name, student number, study program on the first page.
- Please write your name on every page.
- Please only use the handed-out sheets.
- You may answer in English or German.
- All sheets have to be handed back after the exam.
- Do not use pencils or red/green pens.
- Please put your student id and a photo id on your desk.
- Please sign the first page.

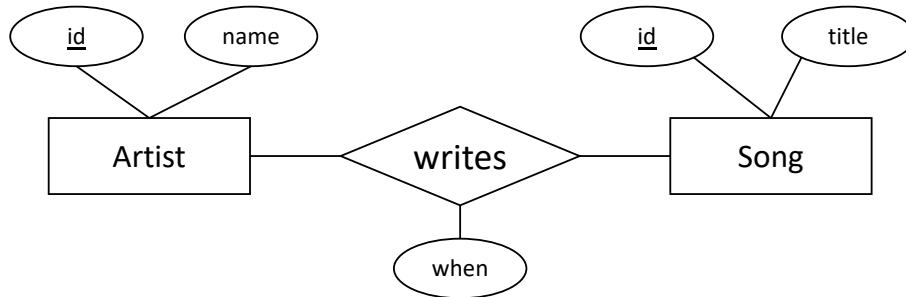
Good Luck! 🍀

Signature: _____

Full name:

Exercise 1 (Entity relationship model, relational schema, SQL DDL) 2+4+4+5 = 15 Points

Consider the following entity relationship model for artists and songs. We assume that composers do not collaborate on songs (i.e., a song is written by exactly one person).



- a) Add functionalities to the entity relationship model (directly in the figure).
- b) Translate the model into the relational schema and refine it (intermediate steps are not required). Add appropriate datatypes and mark primary keys.
- c) Create the necessary SQL DDL statement to create tables in a database system. Choose appropriate datatypes and specify primary and foreign keys as needed.
- d) We want to add playlists to our system. A playlist should have a name and can contain any number of songs. Write down the SQL DDL statements to add these to the database.

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Exercise 2 (SQL Queries) 4+6+5+5 = 20 points [Bonus: 5 points]

Write SQL queries on the known university schema (example instantiation at the end of this exam) for the following tasks:

a) Determine all professors that give at least 2 lectures. (Expected columns in result: person number and name of professor; no duplicates)

b) Execute the following query manually on the attached instantiation of our university database (last page in the exam) and write down the result as a table, including the schema. In addition, please write a sentence explaining what this query calculates.

```
select persNr, name,  
        count(lectureNr) as lecture_cnt,  
        sum(weeklyhours) as sum_hours  
from Professors left outer join Lectures  
        on persNr = given_by  
where level = 'C4'  
group by persNr, name  
order by lecture_cnt desc
```

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- c) Find the student (or students) with the best grade. (Expected columns in result: student name and number, grade, the title of the lecture and the name of the professor who gave that lecture; one student may occur multiple times)
- d) Lazy students: Print out a list of all students that do not attend any lecture. (Expected columns in result: student number and student name; no duplicates)
- e) [Bonus] Busy students: Print out a list of all students that attend every lecture. (Expected columns in result: student number and student name; no duplicates). [Bonus of bonus and also a hint]: Give second solution that is or is not based on counting (depending on whether your first solution was based on counting).

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Exercise 3 (Common database knowledge) 5 Points

a) Name one famous relational database system.

b) Give two good reasons for using a database system and briefly explain why.

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| Professors | | | | Students | | | Lectures | | | |
|------------|------------|-------|------|----------|--------------|----------|------------|----------------------|--------------|----------|
| PersNr | Name | Level | Room | StudNr | Name | Semester | Lecture Nr | Title | Weekly Hours | Given_by |
| 2125 | Sokrates | C4 | 226 | 24002 | Xenokrates | 18 | 5001 | Grundzüge | 4 | 2137 |
| 2126 | Russel | C4 | 232 | 25403 | Jonas | 12 | 5041 | Ethik | 4 | 2125 |
| 2127 | Kopernikus | C3 | 310 | 26120 | Fichte | 10 | 5043 | Erkenntnistheorie | 3 | 2126 |
| 2133 | Popper | C3 | 52 | 26830 | Aristoxenos | 8 | 5049 | Mäeutik | 2 | 2125 |
| 2134 | Augustinus | C3 | 309 | 27550 | Schopenhauer | 6 | 4052 | Logik | 4 | 2125 |
| 2136 | Curie | C4 | 36 | 28106 | Camap | 3 | 5052 | Wissenschaftstheorie | 3 | 2126 |
| 2137 | Kant | C4 | 7 | 29120 | Theophrastos | 2 | 5216 | Bioethik | 2 | 2126 |
| | | | | 29555 | Feuerbach | 2 | 5259 | Der Wiener Kreis | 2 | 2133 |
| | | | | | | | 5022 | Glaube und Wissen | 2 | 2134 |
| | | | | | | | 4630 | Die 3 Kritiken | 4 | 2137 |

| attend | | require | |
|--------|-----------|-------------|-----------|
| StudNr | LectureNr | Predecessor | Successor |
| 26120 | 5001 | 5001 | 5041 |
| 27550 | 5001 | 5001 | 5043 |
| 27550 | 4052 | 5001 | 5049 |
| 28106 | 5041 | 5041 | 5216 |
| 28106 | 5052 | 5043 | 5052 |
| 28106 | 5216 | 5041 | 5052 |
| 28106 | 5259 | 5052 | 5259 |
| 29120 | 5001 | | |
| 29120 | 5041 | | |
| 29120 | 5049 | | |

| test | | | |
|--------|-----------|--------|-------|
| StudNr | LectureNr | PersNr | Grade |
| 28106 | 5001 | 2126 | 1 |
| 25403 | 5022 | 2125 | 2 |
| 29555 | 5022 | 2125 | 2 |
| 29555 | 5001 | 2137 | 2 |
| 27550 | 4630 | 2137 | 2 |

| Assistants | | | |
|------------|--------------|--------------------|------|
| PersNr | Name | Area | Boss |
| 3002 | Platon | Ideenlehre | 2125 |
| 3003 | Aristoteles | Syllogistik | 2125 |
| 3004 | Wittgenstein | Sprachtheorie | 2126 |
| 3005 | Rhetikus | Planetenbewegung | 2127 |
| 3006 | Newton | Keplersche Gesetze | 2127 |
| 3007 | Spinoza | Gott und Natur | 2126 |