

CS 4750: Database Systems (Fall 2025)

POTD 1: FD, F+, Normalization

Due 16-September-2025 1pm EST

Purpose:

- Understand the concepts of normalization
- Understand normalization and database design issues
- Indicate BCNF and 3NF violations
- Determine when a relation needs to be decomposed for database schema refinement

You may work alone or with 2-3 students (max size = 4) in this course.

1. Given a relation R(title, year, length, genre, studioName) and a set of FDs

```
title year -> length
title year -> genre
title year -> studioName
```

Are the above FDs equivalent to the following/single FD?

```
title year -> length genre studioName
```

Circle One: [Yes | No]

2. Given a relation R(title, year, length, genre, studioName) and a set of FDs

```
title year -> length
```

Is the above FD equivalent to the following FDs?

```
title -> length
year -> length
```

Circle One: [Yes | No]

3. *[optional]* Consider a relation about people in the United States, including their name, Social Security number, street address, city, state, ZIP code, (phone) area code, and phone number (7 digits). What FD's would you expect to hold? What are the possible candidate keys for the relation? To answer this question, you need some real world facts. For example, can the same (phone) area code be used in two states? Can the same ZIP code be associated with two (phone) area codes? Can two people have the same Social Security number? Can they have the same address or phone number?

4. Consider the following relation and functional dependencies

$R(A, B, C, D)$

$FDs = \{ A \rightarrow B, B \rightarrow C, B \rightarrow D \}$

Compute F^+

5. Consider the following relation and functional dependencies

$R = (A, B, C, D, E, F)$

$FDs = \{ B \rightarrow AC, C \rightarrow D, F \rightarrow E \}$

Compute F^+

6. *[optional]* Give a scenario in which you would choose to decompose a table using **3NF** (as opposed to BCNF)
7. *[optional]* Give a scenario in which you would choose to decompose a table using **BCNF** (as opposed to 3NF)

Grading rubric

[Total: 10 points]: Done (or provide evidence of your attempt, full or reasonable effort)

- (5 points) — Providing evidence of your attempt, minimal effort
- (-2.5 points) for 24 hours late (submitted after 16-Sep-2025 1pm, by 17-Sep-2025 1pm)
(-5 points) for 48 hours late (submitted after 17-Sep-2025 1pm, by 18-Sep-2025 1pm)

Submission

- [optional] Take a selfie (or picture) of your team and submit it with your POTD
- **Include all team member names and computingIDs in the report.**
- You may do one of the following:
 - take screenshot(s) of your POTD, or
 - save your POTD as a .txt or .pdf file — No Word document.
- Each team submits only **one** copy.
- Upload your report as a PDF to **POTD 1 on Gradescope**. Make sure you **connect your partner** to your group on Gradescope so that everyone receives credit.
- Verify that your POTD is accessible. Making your submission available to instructors and course staff is your responsibility; if we cannot access or open your file(s), we have to assign a zero grade. Be sure to test access to your file(s) before the due date.

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Last updated 2025-09-13 16:23