Databases Autumn 2025

Hand-In Exercise 1

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Aiysha Frutiger
Jannick Seper
Luis Tritschler

Total Points	

Task	**Points**

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Jannick Seper
Luis Tritschler

Task 1

a) `AHV` → `(FullName, Birthday, Zip, country)`
`FullName` → `(FirstName, LastName)`
`Birthday` → `YearOfBirth`
`(County, Zip)` → `City`

The `AHV` uniquely identifies each resident. From these attributes, all others can be derived transitively: `FullName` determines `(FirstName, LastName)`, `Birthday` determines `YearOfBirth`, and `(Country, Zip)` determines `City`. We thought about including `(Country, City)` → `Zip` but there are cities with multiple zips (Zürich for example) and that's why we did not include this dependency.

b) With this functional dependencies we compute the attribute closure for `AHV`. F^+ is `(AHV, FullName, Birthday, Zip, Country, FirstName, LastName, YearOfBirth, City) = sch(Resident)`. Since no subset of `AHV` determines all attributes, `AHV` is minimal and therefore the only candidate key.

c) The relation Resident is in 2NF, since the only candidate key is AHV and therefore no partial dependencies on a subset of a composite key can exist. It is not in Third Normal Form, because there are several transitive dependencies. For example: `AHV` → `(Zip, country)` and `(County, Zip)` → `City`, hence City is transitively dependent on AHV. Version in 3NF:
`Resident(AHV, FullName, Birthday, Zip, Country)`
`Name(FullName, FirstName, LastName)`
`Birthday(Birthday, YearOfBirth)`
`Location(Zip, Country, City)`

Task 2

Task 3

Task 4

Task 5