

Exercise Sheet 8: Datalog & Rulewerk
Maximilian Marx, Markus Krötzsch
Knowledge Graphs, 2023-12-12, Winter Term 2023/2024

Exercise 8.1. Show that any query expressible in Datalog can be expressed as a safe Datalog query.

Exercise 8.2. Show that the inferences under stratified negation and under classical logical semantics do not coincide.

Exercise 8.3. Show how to express the following SPARQL features in (stratified) Datalog:

- property path expressions,
- UNION,
- MINUS, and
- NOT EXISTS.

Exercise 8.4. Compute a stratification for the following Datalog program:

```
mother(x, y) := triple(x, wdt : P25, y)
father(x, y) := triple(x, wdt : P22, y)
notSameMother(x, y) := mother(x, z), ¬mother(y, z)
sameFather(x, y) := father(x, z), father(y, z)
notSameFather(x, y) := ¬sameFather(x, y)
sameMother(x, y) := ¬notSameMother(x, y)
halfSiblings(x, y) := sameMother(x, y), notSameFather(x, y)
halfSiblings(x, y) := sameFather(x, y), notSameMother(x, y)
```

Exercise 8.5. Use the Rulewerk client¹ to solve the following query using a Datalog program and the Wikidata SPARQL endpoint²: find all persons related to Q1339 (“Johann Sebastian Bach”) by a path going through P40 (“child”), P25 (“mother”), or P26 (“spouse”) edges, such that every person on this path has a statement for property P1303 (“instrument”) with value Q1444 (“Organ”).

¹<https://github.com/knowsys/rulewerk/wiki/Standalone-client>

²<https://query.wikidata.org>