B0B36DBS: **Database Systems** | Class 8: **Relational Algebra**

01: Department Teachers

```
Teacher(department="KSI")[name]
```

02: Study Results

```
(
  Enrollment(student=4301 AND semester=201)
  *
  Course
)[code,title,result]
```

```
… Enrollment(student=4301)(semester=201) …
```

```
… Enrollment(semester=201)(student=4301) …
```

03: Subordinate Teachers

```
(
  (
    Teacher(name="Tomáš Skopal")[id]
    [id=chair]
    Department
  )<name→department>[department]
  *
  Teacher
)[name]
```

```
(
  (
    Teacher[name,department]
    *
    Department<name→department>
  )[name,chair]
  *
  Teacher[id,name]<id→chair,name→boss>
)[name,boss](boss="Tomáš Skopal")[name]
```

04: Permitted Courses

```
(
  Schedule(semester=202)(day="MON" OR day="FRI")<course→code>
  *
  Course
)[code,title]
```

```
Schedule(semester=202)(day="MON" OR day="FRI")<course→code>[code]
*
Course[code,title]
```

```
(
   Schedule(semester=202)(day="MON")<course→code>[code]
   ∪
   Schedule(semester=202)(day="FRI")<course→code>[code]
)
*
Course[code,title]
```

05: Prohibited Courses

Incorrect:

```
(
   Schedule(semester=202)(not(day="MON" OR day="FRI"))<course→code>
   *
   Course
)[code,title]
```

Incorrect:

```
Schedule(semester=202)(day≠"MON" AND day≠"FRI")<course→code>[code]
*
Course[code,title]
```

Correct:

```
(
   Course[code]
   \
   Schedule(semester=202)(day="MON" OR day="FRI")<course→code>[code]
)
*
Course[code,title]
```

06: Inactive Students

```
(
   (
      Student[id]
      \
      Enrollment(semester=201 OR semester=202)<student→id>[id]
   )
   *
   Student
)[name,address]
```

```
(
   Student
   ▷
   Enrollment(semester=201 OR semester=202)<student→id>
)[name,address]
```

07: Eager Students

```
Enrollment(semester=202)<student→id>[id,code]
÷
Schedule(semester=202)<course→code>[code]


R := Enrollment(semester=202)<student→id>[id,code]
S := Schedule(semester=202)<course→code>[code]


R ÷ S ≡
   (
     R[id]
     \
     ((R[id] × S) \ R)[id]
   (
```

08: Timetable Conflicts

```
Event := ( Schedule[room=number]Room )[semester,teacher,day,time,building]


(
   Event<semester→s1,teacher→t1,day→d1,time→m1,building→b1>
   [s1=s2 AND t1=t2 AND d1=d2]
   Event<semester→s2,teacher→t2,day→d2,time→m2,building→b2>
)
…


(
   (
      (
         Event<time→m1,building→b1>
         *
         Event<time→m2,building→b2>
      )
      (m1<m2)
      (semester=211)
      (
         ((b1=b2) AND (m1+90+15>m2))
         OR
         ((b1≠b2) AND (m1+90+60>m2))
      )
   )[teacher]<teacher→id>
   *
   Teacher
)[name]
```