Exercise 1

- The following relations are given (primary keys are underlined):
  - COMPETITION(<u>CompetitionId</u>, CName, Place, Date, Discipline)
  - ATHLETE(<u>AthleteId</u>, AName, State, SAId, BirthDate)
  - SPORT_ASSOCIATION(<u>SAId</u>, SAName, Address, City)
  - PARTICIPATION(<u>CompetitionId, AthleteId</u>, Rank, Time)

1

- Assume the following cardinalities:
  - card(COMPETITION) ≈ 10^5 tuples
    - COMPETION.Discipline: 100 distinct values
    - MIN(COMPETION.Date) = 1/1/1998
    - MAX(COMPETITION.Date) = 31/12/2007
  - card(ATHLETE) ≈ 10^4 tuples
    - ATHLETE.State: 100 distinct values
    - MIN(ATHLETE.BirthDate)=1/1/1970
    - MAX(ATHLETE.BirthDate)=31/12/1990
  - card(SPORT_ASSOCIATION) ≈ 10^3 tuples
  - card(PARTICIPATION) ≈ 4 * 10^6 tuples
    - MIN(PARTICIPATION.Rank)=1
    - MAX(PARTICIPATION.Rank)=40
  - Selectivity HAVING COUNT(*) ≥ 5 equal to $\frac{1}{10}$

2

Query 1

```
SELECT SAName, City, COUNT(*)
FROM SPORT_ASSOCIATION S, ATHLETE A
WHERE S.SAId = A.SAId
and State = 'Italy'
and BirthDate > 1979
and AthleteId IN
        (SELECT AthleteId
        FROM COMPETITION C, PARTICIPATION P
        WHERE C.CompetitionId = P.CompetitionId
        and Discipline= ' Breaststroke '
        and Date ≥ 2003
        and Rank ≥ 8
        GROUP BY AthleteId
        HAVING COUNT(*) ≥ 5 )
GROUP BY S.SAId, SAName, City;
```

3

Exercise 2

- The following relations are given (primary keys are underlined):
  - COURSE (IdC, NameC, Level)
  - LESSON (IdL, IdA, #Members, Date, Duration)
  - MEMBERS (MemberId, SocialSecurityNumber, ReleaseDate, BirthDate, Name, Surname)
  - REGISTRATION (MemberId, IdL, Date, Deposit)

4

- Assume the following cardinalities:
  - card(COURSE) ≈ 10^2 tuples
  - card(LESSON) ≈ 10^6 tuples
    - MIN(LESSON.Duration)= 30
    - MAX(LESSON.Duration)= 360
  - card(MEMBER) ≈ 10^5 tuples
    - MIN(MEMBER.BirthDate) = 1/1/1945
    - MAX(MEMBER.BirthDate) = 31/12/1995
  - card(REGISTRATION) ≈ 10^8 tuples
  - Selectivity HAVING COUNT(*) ≥ 5 equal to $\frac{1}{10}$

5

Query 1

```
SELECT M.Name, M.Surname
FROM MEMBER M, REGISTRATION R
WHERE M.MemberId = R.MemberId
and M.Birthdate = 1980
and NOT EXISTS
        (SELECT *
        FROM LESSON L
        WHERE L.IdL=R.IdL
        and Duration ≤ 45)
GROUP BY M.MemberId, M.Name, M.Surname
HAVING COUNT(*) ≥ 5;
```

6