

# Solution 5

October 3, 2005

**Total score:** 25 points

## 1. Problem 5.11 (15 points)

One should realize that the information can be extracted from the `TRANSCRIPT` relation of the system.

As stated in the problem description, the first step is to have the list of all the classes with their enrollment. This can be achieved by using the following expression (based on the operation  $count_{A/B}(R)$ )

$$R_1 = count_{StudID/\{CrsCode, Semester\}}(Transcript)[CrsCode, Semester, TotalCount]$$

(5 points)

Similarly, we can compute the number of students with grade  $< 2$  in each class using

$$R_2 = count_{StudID/\{CrsCode, Semester\}}(\sigma_{Grade < 2}(Transcript))[CrsCode, Semester, NoOfFail]$$

(5 points)

The rest is then simple:

$$\pi_{CrsCode, Semester}(\sigma_{NoOfFail/TotalCount > 0.2}(R_1 \bowtie R_2))$$

(5 points)

## 2. Problem 5.12 (a) (5 points)

List all semesters in which all courses (that were ever taught) were offered.

## 3. Problem 5.13 (5 points)

List the names of all students who took CS305 or CS315.

Equivalent SQL query

```
SELECT S.Name
FROM Student S, Transcript T
WHERE S.Id = T.StudId
AND (T.CrsCode = 'CS305' OR T.CrsCode = 'CS315')
```