CS1555 Recitation 5 – Class Solution

Objective: To practice relational algebra, especially aggregations, joins, and division.

Consider the following relation schemas:

Student (SID, Name, Class, Major)

Student\_Dir (ID, Address, Phone)

FK: (ID) → Student (SID)

Courses\_taken (Course\_No, Term, SID, Grade)

FK: (Course\_No) → Course (Course\_No); (SID) → Student (SID)

Course (Course\_No, Course\_Name, Level)

Instructor (ID, Fname, Lname)

Courses\_offered(Course\_No, Term, InstructorID)

FK: (Course\_No) → Course (Course\_No); (InstructorID) → Instructor (ID)

Write a relational algebra query for each of the queries below:

1. Find the SID(s) of the student(s) who has/have the highest GPA

Student\_GPA(SID, GPA) SIDFAVERAGE GRADE (Courses\_taken)

Highest\_GPA (Max\_GPA) FMAX GPA(Student\_GPA)

RSLT   SID (Student\_GPA ▷◁GPA = Max\_GPA (Highest\_GPA) )

1. Find the SID(s) of the student(s) who has/have taken all courses at the UGrad level

Course\_Denominator  Course\_No *(* Level = 'UGrad' Course)

*RSLT * SID, Course\_No(Course\_Taken)) ÷ Course\_Denominator

1. Find for each instructor, the course names of the courses he/she was teaching in Fall 19. List in addition to the course name, the first name and the last names of the instructor.

Course.Name,Instructor.fname, Instructor.Lname (term=’Fall 19’ (

Instructor▷◁ Instructor.ID = Courses\_offered.InstructorID (Course \* Courses\_offered) ))

1. Find for each instructor the number of courses he/she has taught or is teaching. List the first name and the last name of each instructor along with his/her ID and number of courses.

Courses\_taught(ID, N\_courses) 🡨 InstructorIDFCount course\_no (Courses\_offered)

RSLT 🡨 Courses\_taught \* Instructor