2003 Paper 5 Question 8

Databases

(*a*) (*i*) Define the operators in the core relational algebra. [5 marks]

(*ii*) Define the domain relational calculus. [4 marks]

(*iii*) Show how the relational algebra can be encoded in the domain relational calculus. [3 marks]

(*b*) A *constraint* can be expressed using relational algebra. For example, $R = \emptyset$ specifies the constraint that relation R must be empty, and $(R \cup S) \subseteq T$ specifies that every tuple in the union of R and S must be in T.

Consider the following schema.

`RockStar(`$\overline{\texttt{name}}$`, address, gender, birthday)`
`RockManager(`$\overline{\texttt{managername}}$`, starname)`

(*i*) Give a constraint to express that rock stars must be either male or female. [1 mark]

(*ii*) Give a constraint to express the referential integrity constraint between the `RockStar` and `RockManager` relations. (Note: `starname` is intended to be a foreign key.) [3 marks]

(*iii*) Give a constraint to express the functional dependency `name`$\rightarrow$`address` for the `RockStar` relation. [4 marks]