2003 Paper 12 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(name, address, gender, birthday)
RockManager(managername, starname)
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(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→address for the RockStar relation. [4 marks]