Databases

(a) Define the operators in the (core) relational algebra. [6 marks]

(b) The core relational algebra is often extended with other operators. For the following operators give a definition and an example of their behaviour:

(i) the full outer join operator; [3 marks]

(ii) the aggregate and grouping operator. [5 marks]

(c) X, Y and Z are all relations with a single attribute A. A na"ive user wishes to compute the set-theoretic expression \( X \cap (Y \cup Z) \) and writes the following SQL query.

\[
\text{SELECT } X.A \\
\text{FROM } X, Y, Z \\
\text{WHERE } X.A = Y.A \text{ OR } X.A = Z.A
\]

(i) Give the relational algebra term that this query would be compiled to. [2 marks]

(ii) Does the SQL query satisfy the user’s expectation? Justify your answer. [4 marks]