

Qualifying Exam: Database

Closed books, 60 min., 2013.1

1. Answer the following: (28%)

- 1) What is the weak entity? Give an example.
- 2) What is the data independence?
- 3) What is the completeness of the D-schema with respect to the F-schema?
- 4) What is the referential integrity?
- 5) What is the clustering index?
- 6) Bayesian classifier requires the computation of $p(d|c_j)$. How does the naïve Bayesian classifier estimate $p(d|c_j)$? Assume that d has n dimensions and denote the i th attribute value of d by d_i .
- 7) What is the support for association rules?

2. Select one for each of the following sentences.: (24%)

- 1) 3NF decomposition is (lossless, lossy) join decomposition.
- 2) BCNF decomposition is (lossless, lossy) join decomposition.
- 3) 3NF decomposition (is, is not always) dependency preserving.
- 4) BCNF decomposition (is, is not always) dependency preserving.
- 5) The conceptual design is (dependent, independent) on the data model.
- 6) The physical design is (dependent, independent) on DBMS.
- 7) The logical design is (dependent, independent) on the data model.
- 8) The logical design is (dependent, independent) on DBMS.

3. Consider the following relational schema where the primary keys are underlined.

Suppliers(sid, sname, address)

Parts(pid, pname, color)

Catalog(sid, pid, cost)

For a request “Find the sid’s of suppliers who supply all the blue parts”

- 1) Give a relational algebra expression using DIVISION. (8%)
- 2) Formulate an SQL query using some from EXISTS, NOT EXISTS, EXCEPT. (10%)
- 3) What is the result of the query if there is no blue part? (6%)

4. Answer the following:

1) Set S consists of three classes. The fractions of instances of the three classes are $1/6$, $1/2$, $1/3$, respectively. What is the Gini measure for the purity of S? Show the calculation steps. (6%)

2) How to translate a multivalued attribute in the relational logical design when the order of values is important? Provide two solutions and explain your answer with examples. (18%)