

## CS-542. MidTerm Preparation, Fall 2015, version 1003

The exam will consist of

- A set of true/false or multiple-choice questions.
- A set of short-answer questions, typically of the type seen in our quizzes, requiring at most 3 sentences in the answer.
- At most 2 questions each on the first five sessions of the course – we'll reserve chapter 14 for the final exam.

*In case you want to practice some more*, UIUC has a comprehensive collection of exams they have given over the years, available [here](#). The overlap between their mid-terms and ours is not perfect so you'll have to pick and choose which problems to practice.

The following are the types of detailed questions the mid-term questions will be drawn from. 3-part numbers (e.g., 2.4.8) refer to exercises in the textbook.

1. 2.4.1 (parts f, g, i) Either Relational Algebra or SQL (your choice); no need to run the SQL and show results.
2. 2.4.3 (parts f, i) Either Relational Algebra or SQL (your choice); no need to run the SQL and show results.
3. 2.4.5
4. 2.4.7
5. Consider the SQL Query Q1 whose answer is shown in the table below:

Sid	Name	Login	Age	Gpa
52344	George Wash	wash@example.com	22	3.4
54345	John McCain	abel@example.com	24	1.3

- 1) Modify this query (call it Q2) so that only the login column is included in the answer.
  - 2) If the clause WHERE S.gpa >= 2 is added to the original query, what is the set of tuples in the answer?
6. 2.4.8
  7. 2.4.10
  8. Consider this schema (primary keys **bold**):

*Suppliers*(**sid**: integer, sname: string, address: string)

*Parts*(**pid**: integer, pname: string, color: string)

*Catalog*(**sid**: integer, **pid**: integer, cost: real)

Write the following queries in relational algebra:

- A. Find the names of suppliers who supply some purple part
- B. Find the sid of suppliers who supply every part

- C. Find sid pairs for which supplier of the first charges more for *some* part than supplier of the second
- D. Find the pids of the most expensive parts supplied by *Bucky's Garage*
- 9. Relations R and S have cardinality (# of tuples) of 20 and 30 respectively. What can you say about the cardinality of  $R \cap S$ ,  $R \cup S$ ,  $R \times S$  and  $R - S$ .
- 10. Relations R and S have cardinality (# of tuples) of 20 and 30 respectively. What can you say about the cardinality of R CROSS JOIN S, R LEFT OUTER JOIN S, R RIGHT OUTER JOIN S, R FULL OUTER JOIN and R INNER JOIN S.
- 11. 4.1.2 abcd
- 12. 4.1.6
- 13. 4.1.8
- 14. 4.3.1 ac
- 15. 4.5.1
- 16. 4.6.1
- 17. 4.6.2
- 18. 5.1.3b
- 19. 5.2.2
- 20. 6.2.4
- 21. 6.2.5
- 22. 6.5.1, sections d, e.
- 23. 7.2.1
- 24. 7.2.2 cd
- 25. 7.2.5
- 26. 7.5.2 abc
- 27. Transaction T1 does this to database objects X and Y:  $\{X = X + Y; Y = Y + 2;\}$ . Give an example of a transaction T2 which, if run without concurrency control, could interfere with the correct operation of T1. What could you do to prevent this interference?
- 28. For the Supplier, Part, Catalog tables specified above, for each of the transactions below, what is the minimum isolation level you would be comfortable using, and why?
  - A. A transaction that adds a new part to a supplier's catalog
  - B. A transaction that shows, for each part, the supplier that supplies the part at the lowest price
- 29. 13.3.1
- 30. 13.6.1
- 31. 13.6.4
- 32. 13.6.6
- 33. 13.7.1
- 34. 13.7.4a-c