

Name: \_\_\_\_\_

This test covers: Chapters 1, 2 and 6.

**DUE: March 12 at end of class.**

**Directions:** Complete all questions. Partial credit will be given. You may use your notes, textbook, and the Internet. You may only discuss the exam with the professor. I encourage you to ask any clarifying questions you may have during office hours or via email. Keep in mind there are many ways to answer most questions correctly.

**In class exam:** On Monday, March 12 you will have an in class examination concerning the same dog related information below. Please complete and fully understand the below material *before* March 12. You may bring one sheet of paper with handwritten notes and this take home portion to your exam.

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**The situation:** You have been contracted by your county to develop a database containing information about all the dogs within your county. Vital information includes the dog's name, breed, color, age, whether it has been sterilized, along with its owner and veterinarian's information. Create three relations:

- **Dog:** which includes the dog's name [dName], breed [breed], age [age], gender [gender], spayed/neutered state [intact], owner's name (first/last) [oName], veterinarian's name (first/last) [vName]
- **Owner:** with includes the owner's name (first/last) [name], personal address [address], and telephone number [phone].
- **Vet:** which includes the vet's name (first/last) [name], company name [company], company address [address], open weekends (yes or no) [weekend], and company telephone number [phone].

Please use the given titles in brackets for attributes to prevent confusion during the in class portion of the exam. For simplicity, there is no need to break apart "names", "address" or "telephone number" into separate attributes. For this situation, you may assume the following during all queries:

- All *people's* (owners and vets) names are unique. (ie. there is only one John Smith in the county, but the may be a Mary Smith and a John Diaz.)
- For multiple dogs with the same owner, the dog names are unique. (ie. John Smith can only have one dog named Spike, but John Smith can also have another dog Lassie. Further someone else other than John Smith may have a dog named Spike.)
- All dogs/people/vets live and work in the county and thus information should be in the database.
- NULLs are NOT allowed in any attribute.
- All veterinarian office names are unique.
- All telephone numbers are unique to the given person/company. (ie. Every person has a personal cell phone, and each office has ONE main phone line.)

You may **not** assume:

- Dog names are unique in general.
- There is only one vet per company; likewise there is only one company per vet.

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1.) Using SQL, create a relational schema for the proposed database. Be sure to give each attribute a type and label keys. If you feel something may be controversial, explain why you chose what you chose.

2.) No relational schema is perfect. Assuming this was the relational model settled upon, describe any short comings that may be experienced in practice. You may comment on both the given assumptions and any other issues you feel are relevant. There is no one right answer here, so be sure to provide a quality explanation.

3.) Using *relational algebra*, create a query that provides the names (only!) of all dogs owned by 'John Smith'. You may use any format of your choice (but not SQL).

4.) Using *SQL*, create a query that provides the names and telephone numbers of all veterinarian offices open on weekends. Be sure to list each office once.

5.) A mass paper mailing is to be sent to all dog *owners*, using SQL provide a query that will result in name and address pairs that then can be used to address envelopes. Sort by address (Usually you would sort by zip code, but that does not work here since we have the entire street/city/state/zip in one attribute). To ensure that postage is not wasted, does each person receives only one mailing and why?

6.) A mass paper mailing is to be sent to all *veterinarians*, using SQL provide a query that will result in company name and address pairs that then can be used to address envelopes. To ensure that postage is not wasted, does each *company* receives only one mailing and why?

7.) Using relational algebra, find all veterinarians that are also dog owners.

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8.) A new law has been passed that limits dog owners to having a maximum of 10 dogs. The dog control officer needs a list of the names and addresses of all owners currently violating this law. Provide a SQL query that will return such a list. Does it prevent duplicates?

9.) Find the names of all owners who have intact female Labradors using a SQL query. Be sure to include each name once, and allow for the various types of Labradors, such as Black Labradors, Chocolate Labradors and Yellow Labradors.

10.) Describe what the following query returns in the larger context of the problem:

```
SELECT oName, breed, count(*)  
FROM Dog  
GROUP BY oName, breed
```

11.) You are creating an web-based application that can be accessed by the local town, village and city clerks. You want to create transactions for a few popular tasks. For each of the following scenarios, describe whether the transaction should be READ ONLY or READ WRITE, and which isolation level it should run at (READ UNCOMMITTED, READ COMMITTED, REPEATABLE READ, SERIALIZABLE). Be sure to state why.

I Providing a list of all dogs owned by John Smith.

II Adding the dog 'Spike' (and relevant information) with existing owner 'John Smith'.

III Leila Goldberg is moving out of the county and all her information should be removed from the owner relation and dog relation.

IV A transaction that first provides all dogs that are patients at a given veterinarian, then in another query (but still in the same transaction) provides the names and addresses of owners that have dogs at the given veterinarian.

12.) The vet Jane Wolcott is retiring and all her patients (dogs) will now be assigned to Jeff Foxworthy, who is already in the database. Write a SQL query that will perform such an action.