

Databases - Lab Sheet 6

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Question 1

Suppose $R(A, B, C, D, E)$ has the following functional dependencies

$$AB \rightarrow C, C \rightarrow D, BD \rightarrow E$$

Which of the following does *not determine* E ?

- BE
- BCD
- C
- AB

Just write the answer directly.

Question 2

Suppose $R(A, B, C)$ contains just one tuple $(0, 0, 0)$, and that R must always satisfy the FDs

$$A \rightarrow B, B \rightarrow C$$

Which of the following tuples can be legally inserted into R

- $(0, 1, 0)$
- $(0, 0, 2)$
- $(2, 0, 1)$
- $(1, 2, 0)$

Just write out the legal tuple.

Question 3

Consider the relation $R(A, B, C, D, E, F)$ with FDs

$$CDE \rightarrow B, ACD \rightarrow F, BEF \rightarrow C, B \rightarrow D$$

Which of the following is a key for R ?

- $ABDF$
- ABE
- BDF
- $ABCE$

Just write the answer down directly (i.e. actually write \mathbb{AEF} if you think that is the answer)

Question 4

Suppose $R(A, B, C, D, E)$ satisfies

$$D \rightarrow C, CE \rightarrow A, D \rightarrow A, AE \rightarrow D$$

Which of the following is a key for R ?

- AD
- A
- BD
- BDE

Just write the answer down directly (i.e. actually write AEF if you think that is the answer)

Question 5

Consider a relation $R(A, B, C, D)$. For which of the following sets of FDs is R in Boyce-Codd normal form?

- ① $A \rightarrow C, B \rightarrow A, A \rightarrow D, AD \rightarrow C$
- ② $BC \rightarrow A, AD \rightarrow C, CD \rightarrow B, BD \rightarrow C$
- ③ $A \rightarrow D, C \rightarrow A, D \rightarrow B, AC \rightarrow B$
- ④ $BD \rightarrow C, AB \rightarrow D, AC \rightarrow B, BD \rightarrow A$

Hint: A relation is in BCNF if *every functional dependency* has a *superkey* on the left hand side.

Write down the number of the solution (i.e. write down 2 if you think option 2 is the correct one).

Question 6

Using the `ClassicModels` database, what SQL statement will list the number of employees in each office (by office code).

```
+-----+-----+
| 1           |         6 |
| 2           |         2 |
| ...        |         |
```

(Hint: you only need one table for this)

Question 7

Using the `ClassicModels` database, what SQL statement will list the number of employees in each office (by city).

```
+-----+-----+
| San Francisco |      6 |
| Boston        |      2 |
...

```

(Hint: you need more than one table for this)

Question 8

Using the `ClassicModels` database, what SQL statement will list the names and credit limits of all customers with a *higher than average* credit limit sorted in decreasing order of credit limit.

```
+-----+-----+
| customername          | creditLimit |
+-----+-----+
| Euro+ Shopping Channel |      227600 |
| Mini Gifts Distributors Ltd. |      210500 |
| ...                    |             |
```

Hint: Subquery time

Question 9

Using the `ClassicModels` database, what SQL statement will produce a list of the (names of the) companies that do not have a dedicated sales rep?

```
%select customername from customers where salesrepemployeenumber is null;
+-----+
| customername          |
+-----+
| Havel & Zbyszek Co    |
| Porto Imports Co.    |
..
```

Hint: How is “no sales-rep” indicated in the database?

Question 10

Using the `ClassicModels` database, what SQL statement will produce a list of the last names of the salespeople together with the number of accounts they have (i.e. the number of customers for whom they are the sales rep).

```
+-----+-----+
| Jennings |      6 |
| Thompson  |      6 |
| Firrelli  |      6 |
...

```

Hint: A `GROUP BY` field does not have to appear in the `SELECT`

Question 11

Using the `ClassicModels` database, what SQL statement will produce a list of the last names of *everyone* in the company, together with the number of accounts they have, sorted alphabetically.

```
+-----+-----+
| Bondur |                                0 |
| Bondur |                                6 |
| Bott   |                                8 |
...     |
```

Notice that there are two employees named Bondur and that one of them appears no accounts, because he is not a salesman, and therefore has no accounts.

Hint: This is a tricky *challenge question* - you need a special kind of `JOIN`, which can only be used in the `JOIN . . ON` form, and you need to make sure the count is structured so that it returns 0 when appropriate.