Part 1 - Quiz (25 points)

Q1. (2 points) A database contains exams, and exam questions with a number of points such as the sum of the points of all questions for an exam MUST be 100.The table looks like this:

```
EXAM_QUESTIONS
(primary key is (examid, questionid), all columns not null)
 examid     int  -- Foreign key referencing an EXAMS table
 questionid int  -- Foreign key referencing a QUESTIONS table
 points     int
```

You can assume that we are working on a database that supports window functions, as well as before statement/after statement, before row/after row triggers. The best way to ensure that the sum of the question points is 100 is:

a. A CHECK constraint on column points, for instance CHECK ((sum(points) over (partition by examid) = 100)

b. A FOR EACH ROW trigger that fires BEFORE every INSERT/UPDATE/DELETE on table EXAM_QUESTIONS and checks that the sum of the points for questions related to the current exam is 100

c. A FOR EACH ROW trigger that fires AFTER every INSERT/UPDATE/DELETE on table EXAM_QUESTIONS and checks that the sum of the points for questions related to the current exam is 100

d. A STATEMENT trigger that fires BEFORE every INSERT/UPDATE/DELETE on table EXAM_QUESTIONS and checks that the sum of the points for questions related to the current exam is 100

e. A STATEMENT trigger that fires AFTER every INSERT/UPDATE/DELETE on table EXAM_QUESTIONS and checks that the sum of the points for questions related to the current exam is 100

f. A trigger on table EXAMS (not on EXAM_QUESTIONS) that fires when the professor wants to validate the exam.

Q2. The main difference between a hot backup and a cold backup is:

a. A cold backup backups the whole of the database, a hot backup only backups what has changed since the last backup

b. A cold backup requires the database to be shut down, a hot backup can be performed on an active database

c. A cold backup copies to files, a hot backup copies data to another database (replication)c. A cold backup works on any computer, a hot backup requires mirrored disks.

Q3. Which statement about indexes is wrong?

a. Some queries can return the answer by accessing only an index and not the table.

b. If every column in your table can be used as a search condition, then you should index every column.

c. If the primary key is made up of all columns (as table credits in the film database), the primary key index contains the same data as the table.

d. An optimizer may decide not to use an index.

Q4. Assume a table with a column country that contains many country codes and a column year that contains many years. For a query with a condition such as

```
WHERE country = 'mx' and year between 1995 and 2005
```

it's better to have an index on (country, year) rather than (year, country)(hint: think about how the index is built)

a. True

b. False

Q5. If a table T2 is referenced by a table T1 (i.e., T1 references the primary key of T2) and if rows can be deleted from T2, it's useful to index the foreign key column in T1.

a. True

b. False

Q6. Independently from the concern of having operations succeed or fail together, it makes no performance difference whether you commit globally for multiple changes or once after each change.

a. True

b. False

Q7. A view doesn't have data of its own.

a. True

b. False

Q8. You can use a subquery in an INSERT statement.

a. True

b. False

Q9. When inserting new rows in a table you must list values in the default order of the columns.

a. True

b. False

Q10. All group functions ignore null values.

a. True

b. False

Q11. (2 points) The following query

```
select a.article_name,
       count(distinct c.customer_id) as customers
from articles a
     left join customer_order co
       on co.article_id = a.article_id
     join customers c
       on c.customer_id = co.customer_id
group by a.article_name
```

returns for articles that nobody has bought:

a. Nothing

b. The name of the article and NULL

c. The name of the article and 0

Q12. "Isolation level" when you talk about a database refers to:

a. The security of the database server

b. What other users see when they read data currently modified in a transaction in another session

c. If the database participates in a distributed transaction (with two-phase commit)

d. If a database change (insert, update or delete) is run in an explicit transaction or not.

Q13. What is a trigger?

a. A trigger is an SQL procedure that initiates an action when an event (INSERT, DELETE or UPDATE) occurs.

b. A trigger is an event that can be raised from Stored Procedures.

c. A trigger is an SQL procedure that performs some tasks when a table is queried.

d. A trigger is a procedure which executes when an error occurred.

Q14. A table can have more than one combination of columns that uniquely identify the row in a table; each combination is called_____.

a. Foreign Key

b. Primary key

c. Composite Key

d. Candidate Key

Q15. What does ACID stand for?

a. Atomic, Crypted, Independent, Durable

b. Atomicity, Consistency, Isolation, Decoupling

c. Automatic, Concurrency, Isolation, Durability

d. Atomicity, Consistency, Isolation, Durability

Q16. What is normalization?

a. The application of rules designed for normalizing database transactions.

b. The application of rules designed for improving database performance.

c. The application of rules designed for minimizing data redundancy.

d. None of the above

Q17. Any user with a database account can create tables in a private schema:

a. True

b. False

Q18. If in a view a user-defined function is called, if you grant the right to select from the view you must also grant the right to call the function:

a. True

b. False

Q19. All the queries in a UNION statement must return the same number of columns:

a. True

b. False

Q20. Consider the two following queries:

```
select T1.C1, T2.C2
from T1
     join T2
       on T2.t1_id = T1.id
union all
select T1.C1, cast(null as ...) -- type of C2 column in T2
from T1
where not exists
     (select null
      from T2
      where T2.t1_id = T1.id)
```

and

```
select T1.C1, T2.C2
from T1
     left join T2
       on T2.t1_id = T1.id
```

a. They always return the same result, the first query probably faster

b. They always return the same result, the second query probably faster

c. They may not return the same result if T2.C2 isn't mandatory

Q21. An engine such as Hadoop that implements the map/reduce algorithm is good for:

a. retrieving unstructured data by key very fast

b. storing and processing very cheaply huge volumes of data

c. providing a consistent view of data across many computers

d. processing documents stored as JSON

Q22. A query involving a condition such as

```
where date_column between date_min and date_max
```

a. Will always require fully scanning a table

b. Could use an index on date_column if there is one, or limit scanning to one or a few partitions if the table is range-partitioned on date_column

c. Could use an index on date_column, but not partitions

d. Could use partitions, but not an index on date_column

Q23. To cancel the privileges of a user, the right keyword is:

a. UNGRANT

b. REMOVE

c. REVOKE

d. CANCEL

e. DROP