CMPT 354 - Summer 2019  
Quiz 3: June 13, 2019, 12:30pm (Duration: 35 minutes)

First Name:  
Last Name:  
Student Number:  

This is a quick quiz and is used as a measure of your involved presence in the classroom. You have 35 minutes for the following 25 questions. Please mark your answer, using a pencil, in the provided bubble sheets. Please do not forget to write your name on this page and on the bubble sheets.  
For multiple choice questions, please choose the best option and fully fill the corresponding bubble on bubble sheet. For true or false questions, use the first two bubbles in the bubble sheet respectively.  
Please return the questions with your answer sheet.  

True or False Questions

1) The following E/R diagram is depicting a ternary relationship.  
   (a) True   (b) False  
2) In E/R diagrams, relationships could be replaced by connecting entity sets and new representative relationships.  
   (a) True   (b) False  
3) We have Employees(sin, firstName, lastName, role, rank, salary). The following query on the Employees table will provide the average salary for each of the employees in one certain rank.  
   SELECT AVG(salary) FROM Employees GROUP BY rank;  
   (a) True   (b) False  
4) Subclasses could be used to represent a special case of entity sets. These entity sets have entities with special properties. These special properties are not associated with all members of the original set.  
   (a) True   (b) False  
5) Following the E/R viewpoint and usage of NULL values in converting subclass structures to relations, we always end up with multiple tables. Object-oriented approach, however, will always result in a single relation.  
   (a) True   (b) False  
6) We can decide to combine different elements during converting E/R diagrams to relations. We can combine relations with using attributes of an entity set E, the key attributes of another entity set F, and any attributes belonging to relationship R between those entity sets.  
   (a) True   (b) False  
7) Selection and projection are combine operations.  
   (a) True   (b) False
8) The following E/R diagram is depicting a hierarchical multiway relationship.
   (a) True  (b) False
9) Redundancy, update anomalies, and deletion anomalies can only occur in case of unneeded relationships in E/R design process.
   (a) True  (b) False
10) \( s > \text{ANY R} \) is true if and only if \( s \) is greater than every value in unary relation \( R \).
    (a) True  (b) False
11) Duplicate elimination turns a bag into a set
    (a) True  (b) False
12) Relational data model can make use of hierarchical data model in its element design.
    (a) True  (b) False
13) Only many-to-one relationships can be represented by corresponding relations, therefore, we have to decompose all other types of relationships in E/R model to many-to-one relationship before converting them to relations.
    (a) True  (b) False
14) Aggregations apply to a single attribute. However, COUNT can apply to more than one attribute.
    (a) True  (b) False
15) Applying the SELECT clause is the first step in evaluation order of queries with HAVING clause.
    (a) True  (b) False

**Multiple Choice Questions**

16) Given relations \( R \) and \( S \), which statements can be used to represent constraints in relational algebra?
    (a) \( R > 0 \) and \( R \cap S = 0 \)
    (b) \( R > 0 \) and \( R \bowtie S = 0 \)
    (c) \( R < 0 \) and \( R \times S > 0 \)
    (d) \( R = 0 \) and \( R \subseteq S \)
17) Subqueries that may appear in a FROM clause are the subqueries that
    (a) can return a single constant, and this constant can be compared with another value in a WHERE clause
    (b) can only return parenthesized set of attributes, and be used instead of a stored relation
    (c) can repeatedly refer to a single constant value
    (d) have matching attribute names with the attributes before them in the FROM clause
18) Which derivation is not correct?
    (a) \( R \bowtie S = \pi_L (\sigma_\theta (R \times S)) \)
    (b) \( R \bowtie S = \sigma_\theta (R \times S) \)
    (c) \( R \cap S = R - (R - S) \)
    (d) \( R \bowtie S = \pi_L (R - (R \cup S)) \)
19) A weak entity set is
   (a) An entity set with multiple attributes and more than two relationships.
   (b) An entity set composed of entities that have special properties not associated with all members of the set.
   (c) An entity set composed of attributes, some or all of which belong to another entity set.
   (d) An entity set with entities that can take multiple roles with the same relationship.
20) Based on the tables A, B, and C below, which statement is true?
   (the ‘?’ means that the attribute name after operation is not given in the question)
   (a) Table C could be a result of a theta join on tables B and A
   (b) Table C could be a result of a left outer join on tables B and A
   (c) Table C could be a result of a cross product on tables B and A
   (d) Table C could be a result of the division of table A by table B

<table>
<thead>
<tr>
<th>Table A</th>
<th>Table B</th>
</tr>
</thead>
<tbody>
<tr>
<td>id</td>
<td>firstName</td>
</tr>
<tr>
<td>111</td>
<td>Buffy</td>
</tr>
<tr>
<td>222</td>
<td>Xander</td>
</tr>
<tr>
<td>333</td>
<td>Cordelia</td>
</tr>
<tr>
<td>444</td>
<td>Rupert</td>
</tr>
<tr>
<td>555</td>
<td>Dawn</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table C</th>
</tr>
</thead>
<tbody>
<tr>
<td>111</td>
</tr>
<tr>
<td>111</td>
</tr>
<tr>
<td>222</td>
</tr>
<tr>
<td>333</td>
</tr>
</tbody>
</table>

21) Which of the following we try to achieve in database design?
   (a) Reduced cost of queries
   (b) Reduced number of relations
   (c) Minimized space and low repetition in information presentation
   (d) All of the above
22) Given relations $R$ and $S$ as shown below, which tuples will be dangling in the inner join ($R$ inner join $S$)?
   (a) (3,5,7)
   (b) (1,3)
   (c) (5,7,8)
   (d) (4,10,11)

23) Which statement is correct about the schemas of the results of algebraic operations?
   (a) For product, union, and intersection of two relations, the schemas of the two operands must be the same, and the same schema could be used for the result.
   (b) Result of natural join and renaming have the same attributes of the both relations.
   (c) Resulting schema of a theta join has all the attributes of both relations.
   (d) Resulting schema of a theta join has only a renamed reduced subset of all the attributes of both relations.

24) Which statement is correct?
   (a) We can have up to three levels of subqueries when used in WHERE clause and one level when used in FROM clause.
   (b) Subqueries in WHERE clause cannot have conditions involving full stored relations.
   (c) EXISTS $R$ on relation $R$ is true if and only if $R$ is not empty.
   (d) We cannot use a tuple variable when using an attribute from a subquery.

25) Given the E/R diagram below, which statement is not correct?
   (a) Company is an entity set and a subclass of the Owner entity set.
   (b) FurniturePiece is an entity set and a subclass of the Owner entity set.
   (c) Person has special properties not associated with all members of the Owner entity set.
   (d) OwnedBy could have additional associated attributes.