CMPT 354 - Summer 2019
Quiz 2: May 30, 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 division operation $R/S$ can also be defined as the following:
   \[ R/S = \pi_{(R-S)}(R) - \pi_{(R-S)} [(\pi_{(R-S)}(R) \times S) - S] \]
   (a) True    (b) False

2) Outer join includes only the tuples with matching attributes, and the rest of the tuples are discarded in the final result.
   (a) True    (b) False

3) An equijoin is a special form of Natural Join where equality on all attributes is implied.
   (a) True    (b) False

4) Cross-product could be derived from join and union.
   (a) True    (b) False

5) $\rho_{(A_1, A_2, \ldots, A_n)}(R)$ renames the corresponding attributes $A_1, A_2, \ldots, A_n$ of the relation $R$ to those of relation $S$.
   (a) True    (b) False

6) SQL is a DML language. This means that it specifies the storage modification for data manipulation.
   (a) True    (b) False

7) TRUE AND UNKNOWN = TRUE
   (a) True    (b) False

8) \{1,2,3,1,3,1\} - {1,1} = \{1,2,3\} is correct using bag operations.
   (a) True    (b) False

9) We evaluate a tree expression branch to root.
   (a) True    (b) False

10) ORDER BY gpa ASC, age DESC will sort the results of a query first by gpa ascending and then by age descending. Some results in the gpa might not be sorted if similarly patterned in tuples as those in age.
    (a) True    (b) False
11) `SELECT * FROM Students WHERE name LIKE 'Sa_r%'` will match Sara, Sarah, Sahra, and Sabra.
   (a) True  (b) False

12) `WHERE` helps you select the specific attributes or columns that you are looking for.
   (a) True  (b) False

13) Every correct relational algebraic expression is expressed uniquely and should not have equivalent expressions.
   (a) True  (b) False

14) \( \pi_{\text{title}, \text{year}} (\sigma_{\text{length} \geq 94} (\text{Shows}) \cup \sigma_{\text{studioName} = 'cbc'} (\text{Shows})) \) and \( \pi_{\text{title}, \text{year}} (\sigma_{\text{length} \geq 94} \text{ OR } \sigma_{\text{studioName} = 'cbc'} (\text{Movies})) \) are equivalent, thus incorrect.
   (a) True  (b) False

15) Bag difference can result in owing elements.
   (a) True  (b) False

Multiple Choice Questions

16) Which option shows the linear notation of what is expressed using the following expression tree?
   (a) \( \sigma_{\text{name, lastname}} (\sigma_{\text{grade} \geq 3.5 \text{ AND } \text{volunteered} > 1} (\text{Students})) \)
   (b) \( \pi_{\text{name, lastname}} (\sigma_{\text{grade} \geq 3.5} (\text{Students}) \text{ OR } \sigma_{\text{volunteered} > 1} (\text{Students})) \)
   (c) \( \pi_{\text{name, lastname}} (\sigma_{\text{grade} \geq 3.5} (\text{Students}) \cup \sigma_{\text{volunteered} > 1} (\text{Students})) \)
   (d) \( \rho_{\text{name, lastname}} (\sigma_{\text{grade} \geq 3.5 \text{ AND } \text{volunteered} > 1} (\text{Students})) \)

17) What will the following line do?
   `ALTER TABLE MovieStar ADD phone CHAR(16);`
   (a) Change a tuple in `MovieStar` by adding a phone number to it
   (b) Change the schema for the relation `MovieStar` by adding an attribute named phone to it
   (c) Create a new table with added attribute based on `MovieStar` template
   (d) Alter the table `MovieStar` with changing the domain type for phone attribute

18) Which definition is incorrect?
   (a) \( \sigma_{\text{C}} (\text{R}) \): a relation with tuples from \( \text{R} \) that satisfy some condition \( \text{C} \) that involves the attributes of \( \text{R} \). \( \text{C} \) is a conditional expression with constant or attribute operands.
   (b) \( \pi_{\text{A}_1, A_2, \ldots, A_n} (\text{R}) \): a relation that has the equal tuples from attributes \( A_1, A_2, \ldots, A_n \) of \( \text{R} \). The resulting tuple has values for set \( \{ A_1, A_2, \ldots, A_n \} \) of attributes.
   (c) With two relations \( \text{R} \) and \( \text{S} \), \( \text{R} \cup \text{S} \) is the set of elements in \( \text{R} \) or \( \text{S} \) or both.
   (d) Natural Join \( \text{R} \bowtie \text{S} \) Chooses only one set of tuples to pair from the product \( \text{R} \times \text{S} \), pairing only on common attributes.

19) Given relations \( \text{R} \) and \( \text{S} \) as shown below, and the relation \( \text{R} \bowtie \text{S} \), which tuple is a dangling tuple?
   (a) (1,2)
   (b) (3,4)
   (c) (3,7,8)
   (d) (4,10,11)

<table>
<thead>
<tr>
<th>Relation R</th>
<th>Relation S</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>10</td>
</tr>
</tbody>
</table>
20) Given relations $R$ and $S$ as shown above, which tuple will not be included in the outer left join of the two tables with condition $R.B=S.B$?
   (a) (1, 2, 2, 5, 6)
   (b) (NULL, NULL, 3, 7, 8)
   (c) (3, 4, NULL, NULL)
   (d) b and c

21) Which statement is correct?
   (a) The set of schemas for the relations of a database is called a relational database schema
   (b) Cardinality of a relation = number of attributes
   (c) Referential constraints are derived from application domain
   (d) FALSE OR UNKNOWN = FALSE

22) Given relations $R$ and $S$ as shown above, which tuple should not be in $RxS$?
   (a) (1,2,2,5,6)
   (b) (1,2,5,6)
   (c) (3,4,10,11)
   (d) b and c

23) Given relations $R$ and $S$ as shown above, which tuple should be in $R-S$?
   (a) (1,2,3,7,8)
   (b) (3,4,4,10,11)
   (c) (1,2,2,5,6)
   (d) None of the above

24) Which statement is correct?
   (a) Relational Algebra is a procedural language
   (b) Relational Calculus is not a declarative language
   (c) Relational Calculus involves operations and expressions
   (d) All of the above

25) What is $L$ in $R \bowtie S = \pi_L(\sigma_C (R \times S))$?
   (a) The set of attributes of $R$ and attributes of $S$, minus the ones removed by selection
   (b) A list of attributes, including attributes in the schema of $R$, and those attributes in the schema of $S$ that are not also in the schema of $R$
   (c) A list of attributes containing all of the attributes in the schema of $R$ and the schema of $S$ including the shared attributes identified by being dotted by name of the relation
   (d) All set of tuples meeting the condition $C$ in projection of $RxS$ to the attribute set $C$