CS319 Final Exam
Summer 2000

Name: _____ Student Number: _____

For the following multiple choice questions, pick the BEST answer:

1) In Mandatory security, a top secret user can write to an unclassified table.
   a) True
   b) False

2) In Mandatory security, which of the following is **not** a type of classification?
   a) Top Secret
   b) Secret
   c) Secure
   d) Confidential

3) Which of the following is **not** a method for handling leaks of information via Statistical Database Queries
   a) Limit queries if the result returns a value less than a certain threshold
   b) Limit repeated queries that refer to the same tuples
   c) Limit users to only use the aggregate functions: AVERAGE and COUNT but not any of the other aggregate ones such as MIN, MAX, etc…
   d) Introduce "noise" (inaccuracies) into results to make it difficult to deduce individual information

4) When doing queries with a distributed database, where the fragments must be moved in order to complete the query, the way the system moves the fragments can greatly influence the speed of the query.
   a) True
   b) False

5) When doing a join between table A at Site A and table B at Site B, a Semijoin involves:
   a) Only move the joining attribute from one of the tables at one Site to the other Site
   b) Always move the entire table at one Site to the other Site
   c) Move the first half of the table at one Site to the other Site, do the join and then move the rest of the table at the one Site to the other Site and finish the join
   d) Moving both tables to a third Site, doing the join there and then moving the result back to either Site A or Site B

6) In an Object Oriented Database, the Object ID is
   a) would be exactly the same value as the primary key
   b) can change during the lifetime of the object
   c) generated by the system not the user
   d) none of the above

7) A database that is stored in a centralized location but allows access to its' data from nodes all over the world is a distributed database.
   a) True
   b) False

8) If a committed transaction's updated data is not restored after a crash, then the property violated is:
   a) Atomicity
   b) Consistency
   c) Isolation
   d) Durability

9) If user A owns table X and user A gives BOTH users B and C permission to select from table X with grant option. Then users B and C BOTH give user D permission to select from table X, then user A revokes user B's privilege to select. Which users can still select from table X
   a) User A, User B, User C, User D
   b) User A, User C, User D
   c) User A, User C

d) User A Only

10) Which of the following is NOT one of the 5 basic relational algebra operations?
    a) Projection
    b) Selection
    c) Difference
    d) Cartesian Product
    e) Natural Join

11) There is a view/table in the system catalog in DB2 that contains the names of all the fields in the entire database
    a) True
    b) False

12) There is a view/table in the system catalog in DB2 that contains the names of all the views and tables in the database **including** it's own name
    a) True
    b) False

13) A database management system that uses locking does not need to worry about handling deadlock situations BUT it must handle livelock situations.
    a) True
    b) False

14) Db2start will
    a) Start a process running that manages your db2 session, this process must be stopped by you at some point
    b) Load up your database
    c) Start a DBMS program called db2 so that you can interface with db2
    d) Open a port to db2

15) Which keyword (s) was used in your third assignment to move from the cursor from pointing at the current record to point to the next record?
    a) NEXT
    b) FETCH
    c) EXEC SQL DECLARE c1 CURSOR FOR Select lastname from doctor
    d) MOVE

16) To show all the names of your tables and views in your db2 database you could:
    a) Select from the system table that contains the names of tables and views (SYSCAT.TABLES)
    b) Type the DB2 command: *List tables*
    c) Type the SQL command: *Select * from tables*
    d) A and B only
    e) You can not show the names of the tables, only the data that is in a particular table or view

17) Any schedule where all transactions use Binary Locking is guaranteed to be:
    a) Deadlock Free
    b) Conflict Equivalent to a Serial Schedule
    c) Both of the above
    d) Neither of the above

18) If you have 10,000 electronics customer records and of those 10,000 customers, only 100 customers have a (one only per customer) record player with a serial number identifying the record player. What is the best way to store this attribute assuming that the number of customers with record players will probably not grow, but it may shrink and you don't need to reference this information often.
    a) Have an attribute in the customer table called *recordplayerID*
    b) Create a new table called *CustomerOwnsRecordPlayer* that contains the CustomerID and the RecordPlayerID.
    c) Neither of the above 2 choices is better than the other choice

19) Assume we have your tables from assignment 2: Video, Customer, Genre and Rents. Which of the following is true:
    a) VideoID → CustomerID
    b) GenreID functionally determines GenreDescription
    c) GenreID is functionally dependent on GenreDescription
    d) VideoTitle → VideoID

e) None of the above are true

20) VideoID, CustomerID → VideoTitle is a partial functional dependency.
a) True
b) False

21) There is more than one way to put a table with non atomic values into first normal form, thus if you put the table into first normal form one way, and another person put the same table into first normal form another way, you might end up with an different number of tables than the other person after you have both finished first normalizing that table.
a) True
b) False

22) If the table contains only one candidate key, 3NF and BCNF are equivalent
a) True
b) False

23) The lossless join property
a) guarantees we don't have extra tuples when we join relations
b) guarantees we don't lose any tuples when we join relations
c) reduces the need for joining tables
d) a and c
e) b and c

Assume we have the relation R: {A,B,C,D,E,F,G,H,I,J,K,L,M,N,O,P,Q} with the following functional dependencies: {{A, B, E, F} → {C, G}, {A} → {D, I}, {A, F} → {J}, {B, E} → {K}, {B} → {M, N}, {E}→ {O}, {F}→{P}, {K}→{H, L}, {D}→{Q}}

24) If we put the above relation R into second normal form, we will end up with:
a) 6 relations
b) 7 relations
c) 8 relations
d) 9 relations
e) none of the above

25) Then if we put the above relation R into third normal form, we will end up with a total of:
a) 6 relations
b) 7 relations
c) 8 relations
d) 9 relations
e) none of the above

Assume we have the following tables:

Woman:

WomanID	**FirstName**	**LastName**	**MotherofWomanID**	**CityofBirthID**
5	Chelsea	Clinton	45	TA
45	Hilary	Clinton	23	DE
23	Betty	Rodham	0	TA
22	Kathy Lee	Gifford	0	DE
0	Unknown	Unknown	0	DE
26	Cassidy	Gifford	22	LA

BirthLocation:

CityOfBirthID	**City**	**State**	**Country**
TA	Tampa	FL	USA
TO	Toronto	ON	Canada
LA	Los Angeles	CA	USA
DE	Denver	CO	USA

We also have the following SQL referential constraints:
- alter table Woman add constraint C1 Foreign key (MotherOfWomanID) references Woman(WomanID)
- alter table Woman add constraint C2 Foreign key (CityOfBirthID) references BirthLocation(CityOfBirthID)

Which of the following will violate one or both of the above referential constraints or key constraints: (Answer each of the following questions about the above tables as they are currently, don't assume the previous questions have changed the tables)

26) Delete from BirthLocation where City = 'Tampa'
    a) Violates
    b) Doesn't Violate

27) Update BirthLocation set City = 'Dover' where City = 'Denver'
    a) Violates
    b) Doesn't Violate

28) Insert into Woman values (42,'Betty','Ford', 34, 'LA')
    a) Violates
    b) Doesn't Violate

29) Delete from Woman where WomanID = 22
    a) Violates
    b) Doesn't Violate

30) Update Woman set MotherOfWomanID = 26 where WomanID = '0'
    a) Violates
    b) Doesn't Violate

31) Insert into BirthLocation Values ('LB','Los Angeles', 'CA', 'USA')
    a) Violates
    b) Doesn't Violate

32) Update Woman set WomanID = '24' where WomanID = '22'
    a) Violates
    b) Doesn't Violate

33) Assume you have a table Employee with the following fields {SSN, LastName, Sex, Email, DeptCode, DeptName, DeptLocation}. What problem would occur when deleting employees from this table that is not in third normal form?
    a) You might delete an employee you didn't mean too
    b) If the employee you are deleting is the last employee in a department, then when you delete that employee, you also accidentally lose all information about that department.
    c) You can no longer delete employees by using referencing their department code
    d) No problems occur when you do deletions from a table that is NOT in third normal form

34) When optimizing a query, we should **always** pick the best solution for performing the query
    a) True
    b) False

35) When optimizing a query, it is usually better to do the selects before the joins
    a) True
    b) False

36) When optimizing a query, the system creates a
    a) Query table
    b) Query graph
    c) B+ tree
    d) Query tree

37) On tables that have no index and no hash key, it is faster to do a join with tables that are both sorted on the join key than with unsorted tables.
    a) True
    b) False

38) When doing a query that is pipelined, the temporary results of the query are sent right to the next query rather than stored in a temporary table.
    a) True
    b) False

39) If your query includes a selection that has *Select … where TablesKey = SomeValue*, this would be good query to do first as it is the most restrictive selection possible without returning an empty table.
    a) True

b) False

40) ODBC interprets SQL commands from a program and sends them off to numerous different databases, depending on which Data Source Name is selected and sends the resulting records (if any) back to the program, acting like a bridge between the program and the database on a PC.
a) True
b) False

41) RecordSet Objects in ADO are similar to ResultSet Objects in JDBC
a) True
b) False

42) Field Objects in ADO are similar to Statement Objects in JDBC
a) True
b) False

43) ASP technology allows you to write code that connects to a database. The code runs on the client machine and the database must be on the client machine.
a) True
b) False

44) If the client does VIEW SOURCE inside the browser on an ASP page, the client can see the code that was written to return the records from a database.
a) True
b) False

```
Import java.sql.*;
Import java.io.*;
Class DB2Sample {
  Static {
   try {
      Class.forName("COM.ibm.db2.jdbc.net.DB2Driver");              // Statement A
    }  catch (ClassNotFoundException e) {
    ....
   }
 }
 public static void main(String argv[]) {
   try {
    Connection con = DriverManager.getConnection("jdbc:db2://gaul.csd.uwo.ca:6788/lreid, "lreid", "pwd");    // Statement
B
    Statement stmt = con.createStatement();
    ResultSet rs = stmt.executeQuery("SELECT * from Products where pid > 56");    // Statement C
    While (rs.next()) {                                                  // Statement D
       String str1 = rs.getString("Description");                        // Statement E
       String str2 = rs.getString(2);                                    // Statement F
       System.out.print(" Result 1= " + str1);
       System.out.println(" Result 2= " + str2);
   }  // end of while loop
....
}
```

Use the above code to answer the following questions:

45) Statement A is:
a) loading the DB2 Driver
b) starting the DB2 process
c) registering itself with the DriverManager object
d) a and b only
e) a and c only

46) Statement B is:
a) picking the correct driver to use of those currently loaded
b) opening a connection to the database
c) starting a port on which db2 will listen for db2 requests
d) all of the above
e) a and b only

47) Statement C is:
   a) pointing rs at a bunch of records
   b) pointing rs at a table called Products
   c) pointing stmt at a bunch of records
   d) pointing stmt at a table called Products

48) In Statement D, the code *rs.next()*
   a) is moving rs from the current record to the next record and checks to see if we are at the last record
   b) is moving rs from the current field to the next field and checks to see if we are at the last field
   c) never moves to a new record, it only checks to see if we are at the last record
   d) never moves to a new field, it only checks to see if we are at the last field
   e) none of the above.

49) Statement E:
   a) puts the string “Description” into the variable str1
   b) puts the string “Description” into the field in current record of rs
   c) puts the value of the current record’s field called Description into a string object called str1
   d) gives the current field of rs the name “Description”
   e) none of the above

50) Statement F:
   a) won’t work because 2 is not a string
   b) puts the value of the second field of the current record into the string object called str2
   c) puts the value of the second record into the string object called str2
   d) converts the integer 2 to a string and stores that string in a string object called str2

51) What does the command db2jd do?
   a) Starts a db2 process
   b) Listens on a port for incoming JDBC commands
   c) Connects to a database
   d) Compresses and zips files together

52) Why do we need a jar file with applets that use JDBC?
   a) Because the applet is too big and must be compressed to run on the clients machine
   b) Because the port may not exist
   c) Because the client machine running the applet might not have all the JDBC and database class files
   d) Because the applet and the database must reside on the same machine

53) Each database company must supply their own implementation of the required JDBC classes and interfaces in order to allow their customers to write Java code that with connect to the database company’s database.
   a) True
   b) False

54) It is only possible to write queries (Select Statements) with JDBC, it is not possible to update the database (Update, Delete and Insert Statements) with JDBC.
   a) True
   b) False

55) Unfortunately, we can only use JDBC to connect to mainframe databases like DB2, JDBC will **not** allow us to communicate with PC databases like Access even if we use ODBC.
   a) True
   b) False

56) Which of the following is **NOT** part of the triple that makes up a type constructor for an Object Oriented Database Object?
   a) Primary Key
   b) OID
   c) Type Constructor
   d) Current Value

57) Which of the following is **NOT** a disadvantage of designing and building an Object Oriented Database
   a) Lack of standards
   b) Not based on a theoretical foundation like the relational model
   c) Not many experts in this field yet

d) It does not allow us to reuse existing code or objects

58) Suppose we have two transactions:T1 and T2, and both transactions use a variable X. If one schedule does all of T1 first and then all of T2 and X ends up having the value 55, but another schedule does all of T2 first and then all of T1 and X ends up having the value 67, then one the above two schedules was **NOT** conflict equivalent to a serial schedule.
a) True
b) False

59) Most DBMS do **NOT** test if a schedule is serializable, rather they use techniques that will never allow non serialiable schedules to occur.
a) True
b) False

60) Which of the following granularities of locking will be the **most** restrictive to other transactions that are waiting for a locked item
a) Database Level
b) Table Level
c) Row Level
d) Field Level

61) In 2-phase locking a transaction must:
a) Release all it's locks at the same time
b) NOT obtain any new locks once it has started releasing locks
c) Only obtain locks on items not used by any other transactions
d) Ensure that deadlock will never occur

62) If you use timestamping to ensure serializability, you will never have to perform rollbacks
a) True
b) False

63) The optimistic method works best in a database that has
a) Lots of inserts, updates and deletes but very few selects
b) Lots of selects and very few updates, inserts and deletes
c) Lots of rollbacks
d) Lots of concurrent writing to the database

64) *(2 Marks)* The following schedule is conflict equivalent to a serial schedule:
a) True
b) False

Time	Transaction
1	T1: read x
2	T1: x = x – 50
3	T2: read x
4	T2: x = x + m
5	T1: x = x + 55
6	T1: write x
7	T2: write x

65) (2 Marks) The following schedule is conflict equivalent to a serial schedule:
a) True
b) False

Time	Transaction
1	T1: read x
2	T1: read y
3	T2: read x
4	T1: y = x – 43
5	T2: x = x + 56
6	T1: y = y + 56
7	T2: write x
8	T3: read x
9	T1: write y
10	T3: x = x + 10
11	T3: write x

66) (2 Marks) The following schedule is conflict equivalent to a serial schedule:

a) True
b) False

Time	Transaction
1	T3: read x
2	T3: x = x – 4
3	T3: write x
4	T2: read x
5	T2: x = x + 23
6	T2: write x
7	T1: read x
8	T1: x = x + 4
9	T1: write x
10	T3: write y
11	T3: write y

Written Section (Worth 31 Marks)

67) (*20 Marks)* Given the following relations:

Doctor:

DName	BirthDate	Phone
a	b	c

Nurse:

Nname	BirthDate
D	e

IsDoctoredBy:

Dname	PName	LastDateOfDoctorVisit
G	h	i

Patient:

Pname	HospitalRoomNumber	Birthdate
j	k	l

IsNursedBy:

Nname	PName
m	n

a) (5 Marks) Write the SQL to list all doctors' names that are not treating anyone(QUERY 1).

b) (5 Marks) Write the domain calculus for QUERY 1 (using the labels for the tables as listed below the tables) **OR** write the tuple calculus.

c) (5 Marks) Write the SQL to list all the patient's names and HospitalRoomNumber who are being treated by a doctor and a nurse who have the same birthdate as the patient. (QUERY 2)

d) (5 Marks) Write the relational algebra for QUERY 2

68) (11 Marks) Assuming you have the following data, in the following tables:

Author:

AID	Name	Alive
1	Maeve Binchy	Yes
2	Stephen King	Yes
3	William Shakespeare	No
4	John Grisham	Yes
5	Robin Cook	Yes
6	Dr. Suess	No

Publisher:

PID	Name	City
22	Addison Wesley	Toronto
33	Benjamin Cumming	New York
44	Prentice Hall	Toronto
66	McGraw Hill	Toronto
77	Books-R-Us	Springfield

Book:

ISBN	Title	Cost	PID	Pdate
99	Are You My Mother	12.99	22	May-12-1998
100	All Done CS319	150.00	33	Jul-21-1999
111	It	6.95	22	May-1-1980
222	The Shining	7.75	44	May-2-1996
333	Tara Road	6.00	22	Aug-24-1963
444	Stand By Me	7.00	33	Jul-3-1997
555	Romeo and Juliet	15.25	77	Apr-6-1997

Writes:

AID	ISBN	Wdate
1	333	Jul-1-1951
1	444	Jul-2-1990
2	111	Feb-20-1970
2	222	Feb-15-1980
2	444	Aug-2-1990
6	99	Feb-19-1964
3	555	Dec-24-1545
6	100	Jul-19-1999
4	100	Jul-19-1999
5	100	Jul-19-1999

List the tuples that would result from the following statements (YOU DO NOT NEED TO SHOW YOUR WORK, JUST THE FINAL ANSWER):

a) (4 Marks) Select Publisher.Name, Author.Name, Title, Wdate from Author, Publisher, Book, Writes where Cost > 10.00 and Alive = 'Yes' and Writes.ISBN = Book.ISBN and Author.AID = Writes.AID and Book.PID = Publisher.PID order by Author.Name

b) (4 Marks) Select title from book where ISBN in (Select ISBN from Writes group by ISBN having count(ISBN) > 1)

c) (3 Marks) In 1 or 2 sentences of plain English, explain what the results from question b above, represent in reality (such that a 10 year old would understand!!!).

This expression returns the set of …