

NAME (LAST, FIRST)_____

GT_ID_____

CS4400 – Summer 2009
QUIZ 2 (Navathe/Omicinski – June 16, 2009)

(26 questions – one bonus question is added. **Points will be given as 4*(no of correct answers))**

1. Which statement(s) is/are true for the Customer relation?
 - (a) CID, Cname is a superkey
 - (b) the degree of the relation is 3
 - (c) the 6 tuples represent a state of the CUSTOMER relation
 - (d) all of the above
 - (e) Only (a) and (b)

2. Which of the following statements are true?
 - (a) a tuple in the CustomerAccount relation cannot have a null value for AID
 - (b) a tuple in the Account relation cannot have a null value for Balance
 - (c) a tuple in the TransactionHistory relation cannot have a null value for Date
 - (d) all of the above
 - (e) Only (a) and (c)

3. Which of the following statements are true?
 - (a) Several attributes in a relation may have the same domain.
 - (b) The relation state does not always have to correspond to the relation schema.
 - (c) The order of tuples is immaterial according to the mathematical definition of a relation.
 - (d) only (a) and (c)
 - (e) all of the above

4. A null value for an attribute value of a tuple in a relation may indicate which of the following?
 - (a) value unknown
 - (b) value exists but is not available
 - (c) attribute and value are undefined in that they do not apply to this tuple
 - (d) any of the above

5. A relation schema may have
 - (a) no key at all
 - (b) multiple primary keys
 - (c) multiple candidate keys
 - (d) multiple superkeys
 - (e) both (c) and (d)

6. "Type" in Account relation can be described as
 - (a) An attribute
 - (b) A domain consisting of two values :<savings> and <checking>
 - (c) A superkey
 - (d) both (a) and (b)
 - (e) All of the above

7. How many superkeys does the Customer relation have?
 - (a) 2
 - (b) 3

- (c) 4
- (d) 5

8. Which of the following tuple insertions would violate a relational model constraint?
- (a) insert <109,'Carla Hughes','Marietta'> into Customer
 - (b) insert <109,6> into CustomerAccount
 - (c) insert <9,'2009-06-16',3000, 'Deposit'> into TransactionHistory
 - (d) both (b) and (c)
 - (e) All of the above
9. If the tuple <103, 'Bob Jones', Atlanta> is deleted from Customer and if cascading of deletes is in effect to all affected relations, how many transactions (tuples) will get deleted from TransactionHistory relation?
- (a) 1
 - (b) 3
 - (c) 5
 - (d) 7
10. If we insert a tuple < 106,6 > into the CustomerAccount relation,
- (a) It will be rejected due to entity integrity violation
 - (b) It will be rejected due to referential integrity violation
 - (c) It will be accepted because entity and referential integrity are observed
 - (d) It will be rejected because 106 already has too many accounts
 - (e) It will be accepted because customer 106 must own some account
11. Jane Smith has changed her name to Jane Dawson. An update operation to set Cname = 'Jane Dawson' will
- (a) Not be allowed because Cname is a candidate key
 - (b) Not be allowed because Cname is a foreign key
 - (c) be allowed
 - (d) Not be allowed because entity integrity is violated
12. How many tuples are returned by the query: $\pi_{CID}(\sigma_{AID = 6 \text{ AND } AID=1}(\text{CustomerAccount}))$?
- (a) 0
 - (b) 1
 - (c) 2
 - (d) 3
13. What is the result of the following relational algebra query?
 $\pi_{AID}(\text{Account}) - \pi_{AID}(\text{TransactionHistory})$
- (a) a relation with one column and zero tuples
 - (b) a relation with one column and one tuple whose value is 6
 - (c) a relation with one column and 6 tuples with values 1 through 6
 - (d) none of the above
14. What is the result of the following relational algebra query?
 $\pi_{CID}(\text{CustomerAccount}) \cap \pi_{CID}(\text{Customer})$
- (a) a relation with one column and zero tuples
 - (b) a relation with one column and two tuples with values 104, 105
 - (c) a relation with one column and 5 tuples with values 101,102,103,104,105
 - (d) a relation with one column and 6 tuples with values 101,102,103,104,105,106
15. What is true of the following relational algebra query?

- $(\sigma_{\text{Type} = \text{'Checking'}} \text{Account}) * (\sigma_{\text{Trans_type} = \text{'Withdraw'}} \text{TransactionHistory})$
- (a) It returns nothing because natural join will not produce a result
 - (b) It returns the concatenation of tuples from Account and TransactionHistory where a checking account had a withdraw transaction
 - (c) It will have two tuples in the result
 - (d) It will have three tuples in the result because of three checking accounts
 - (e) Both (b) and (c)

16. How many tuples will be returned by the following relational algebra query?

- $(\sigma_{\text{Type} = \text{'Saving'}} \text{Account}) * (\sigma_{\text{Trans_type} = \text{'Deposit'}} \text{TransactionHistory})$
- (a) 2
 - (b) 3
 - (c) 4
 - (d) 9

17. What does the following relational algebra query return as its result?

$$\pi_{\text{Cname}}((\pi_{\text{AID}}(\text{Account}) - \pi_{\text{AID}}(\text{TransactionHistory})) * \text{CustomerAccount} * \text{Customer})$$

- (a) A relation with one column and one row whose value is 'John Smith'
- (b) A relation with one column and two rows whose values are 'Jane Smith' and 'Bob Jones'
- (c) A relation with one column and two rows whose values are 'Jim Brown' and 'Sue Brown'
- (d) A relation with one column and three rows whose values are 'John Smith', 'Jane Smith' and 'Bob Jones'

18. Which relational algebra query will return the ID and Name of customers who do not have any accounts?

- (a) $\pi_{\text{CID}, \text{Cname}}(\text{CustomerAccount}) \div (\pi_{\text{CID}}(\text{Customer}))$
- (b) $(\pi_{\text{CID}}(\text{Customer}) - (\pi_{\text{CID}}(\text{CustomerAccount}))) * (\pi_{\text{CID}, \text{Cname}}(\text{Customer}))$
- (c) $\pi_{\text{CID}, \text{Cname}}(\text{Customer}) - \pi_{\text{CID}}(\text{CustomerAccount})$
- (d) none of the above

19. How many tuples appear in the result of the following query?

$$(\pi_{\text{CID}}(\text{Customer}) \times \pi_{\text{AID}}(\text{TransactionHistory})) - \text{CustomerAccount}$$

- (a) 54
- (b) 47
- (c) 23
- (d) 29

20. Which of the following queries return CID of Customers that have no accounts?

- (a) $\text{Customer} - \text{CustomerAccount}$
- (b) $\pi_{\text{CID}}(\text{CustAccounts}) \cap \pi_{\text{CID}}(\text{Customer})$
- (c) $\pi_{\text{CID}}(\text{Customer}) - \pi_{\text{CID}}(\text{CustomerAccounts})$
- (d) All of the above
- (e) Both (a) and (c)

21. How many tuples will be returned by the following relational algebra query?

Account OUTER JOIN TransactionHistory
(Note: regard this as full outer join on AID)

- (a) 6
- (b) 8
- (c) 10
- (d) 42

22. What holds for the result of executing the following relational algebra query?

$\rho(\text{Date, No_trans}) (\text{Date} \bowtie \text{Count AID} (\text{TransactionHistory}))$

- (a) It produces a two column summary table of dates with no. of transactions on each date
- (b) It has six tuples
- (c) It contains the tuple <'2009-06-15' , 2>
- (d) Only (a) and (c)
- (e) All of the above

23. What is the result of executing the following relational algebra query?

$\rho(\text{Type, Amount}) (\text{Trans_type} \bowtie \text{Sum Amount} (\text{TransactionHistory}))$

- (a) A two column relation having attribute names Type and Amount
- (b) A two column relation with tuples (<'Withdraw', 24550 > and , 'Deposit', 410 >)
- (c) A two column relation with 9 tuples showing transaction types with amounts
- (d) Both (a) and (b)

24. Which query produces the following result as a scalar value 4 in an appropriate relation?

- (a) $\bowtie_{\text{Count CID}} (\sigma_{\text{CID} = 101 \text{ OR } \text{AID} = 6} \text{CustomerAccount})$
- (b) $\bowtie_{\text{Count AID}} (\sigma_{\text{Trans_type} = \text{'Withdraw'}} \text{TransactionHistory})$
- (c) $\pi_{\text{AID}} (\sigma_{\text{Balance} > 150} (\text{Account}))$
- (d) all of the above
- (e) Only (a) and (b)

25. What does the following relational calculus query do?

$\{a. \text{AID}, a. \text{limit} \mid \text{Account} (a) \wedge (\exists t) (\text{Transaction_History}(t) \wedge t. \text{Trans_type} = \text{'Withdraw'} \wedge t. \text{AID} = a. \text{AID} \wedge t. \text{Amount} > a. \text{Limit})\}$

- (a) It returns the Id and Limit from accounts that have a non-zero limit and a transaction history containing some withdrawals.
- (b) It returns the ID and Limit from accounts that had withdrawals
- (c) It returns the ID and Limit from accounts that had withdrawals which exceeded the limit on the account
- (d) It returns the ID and Limit from accounts that had withdrawals and whose balance exceeds the limit

26. To retrieve customer ids for customers having transactions exceeding \$5000 in amount, the following queries can be used:

- (a) $\{c. \text{CID} \mid \text{CustomerAccount} (c) \text{ AND } (\exists t) (\text{Transaction_History}(t) \text{ AND } t. \text{Amount} > 5000) \}$
- (b) $\{c. \text{CID} \mid \text{CustomerAccount} (c) \text{ AND } (\exists h) (\text{Transaction_History}(h) \text{ AND } h. \text{Amount} > 5000 \text{ AND } h. \text{AID} = c. \text{AID}) \}$
- (c) $\pi_{\text{CID}} (\sigma_{\text{Amount} > 5000} \text{Transaction_History} * \text{CustomerAccount})$
- (d) Both (a) and (c)
- (e) Both (b) and (c)