

Name: \_\_\_\_\_ CS 5300 Chapter 14 and 15 Homework

Answer the following questions with a True or False (2 pts each).

- 1)   T   A purpose of Normalization is to make the relations semantically clear.
- 2)   F   The worst way to handle a Multi-Valued Dependency is to remove the Multi-Valued attribute and put it in its own table with the primary key.
- 3)   T   A Decomposition of R is said to have a Lossless Join Property when all the Relations in the Decomposition can be Naturally Joined together.
- 4)   T   A Multi-Valued Dependency are Dependencies with more than one attribute in the Right-Hand Side.
- 5)   T   The Inference Rules can be used to determine the Cover of a set of Functional Dependencies.
- 6)   T   A purpose of Normalization is to minimize redundancy.
- 7)   T   A Dangling Tuple is a sign you may have gone too far with Decomposition.

Answer the following questions with letter next to the correct answer (2 pts each).

- 8)   B   If the Relation had no Multi-Valued dependencies and no Partial Functional Dependencies, but has Transitive Functional Dependencies it is most likely in which Normal Form:
  - a) First Normal Form
  - b) Second Normal Form
  - c) Third Normal Form
  - d) Boyce-Codd Normal Form
- 9)   B   If two tables are joined and one of the attributes being joined has NULL values, then the table is susceptible to:
  - a) Deletion Anomalies
  - b) Losing Tuples
  - c) MVD
  - d) Spurious Tuples

10) Use the following ART table to answer parts a, b, c, and d:

ART

ITEM	NAME	ARTIST	ORIGIN_ID	DATING	MEDIA
9182	One Hundred Horses	Lang Shining	China	960 to 1127	Painting
6922	The Great Wave off Kanagawa	Katsushika Hokusai	Japan	1829 to 1833	Painting
2049	Toluvila statue	NULL	Sri Lanka	300 to 400	Statuary
2038	Sasanian silver vessel	NULL	Tajikistan	700 to 722	Silver
3964	Nymph of the Luo River	Gu Kaizhi	China	317 to 420	Painting
3097	The Hunt of the Unicorn	NULL	France	1680	Tapestries

- a) Describe an operation on the ART table that would cause a Deletion Anomaly (5 pts).

An example of a deletion anomaly would be if the artwork “The Hunt of the Unicorn” was deleted from the database, all information pertaining to the country of France would be lost.

- b) Describe an operation on the ART table that would cause an Update Anomaly. (5 pts)

An example of an update anomaly would be if the origin\_id of “China” was updated on item 9182 to “China Mainland” but did not change for item 3964. This would cause an inconsistency in the database.

- c) Describe an operation on the ART table that would cause an Update Anomaly. (5 pts)

Another example of an update anomaly is if the Artist attribute was updated on item 9182 to a lastName. firstName format such as “Shining, Lang”. This would cause an inconsistency in the database and make searching for data more difficult.

11) Given the following Universal Relation and Functional Dependencies answer parts a,b, and c.

$R = \{A, B, C, D, E, F, G, H, I, J, K\}$

$A, B \rightarrow C$

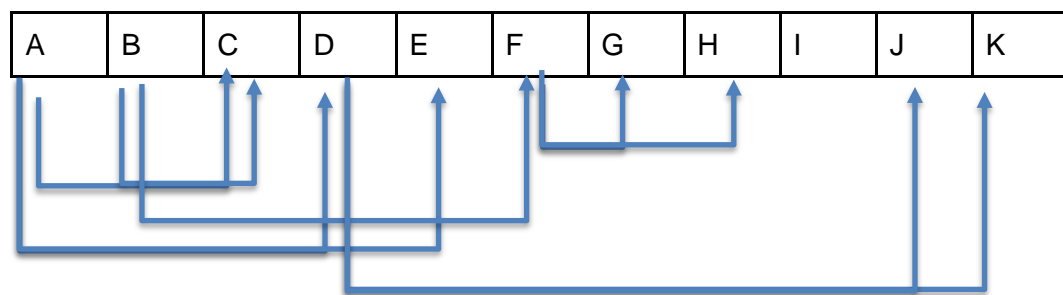
$A \rightarrow D, E$

$B \rightarrow F$

$F \rightarrow G, H$

$D \rightarrow J, K$

a) Diagram the Functional Dependencies below (5 pts).



b) Determine the Cover of the above Functional Dependencies (5 pts).

$B \rightarrow F, F \rightarrow G, H \dots B \rightarrow G, H$

$A \rightarrow D, D \rightarrow J, K \dots A \rightarrow J, K$

$R =$

{

$A, B \rightarrow C$

$A \rightarrow E, J, K$

$B \rightarrow G, H$

}

c) Determine the Minimal Cover of the above Functional Dependencies (5 pts).

R =  
{  
     $A, B \rightarrow C$   
     $A \rightarrow E$   
     $A \rightarrow J$   
     $A \rightarrow K$   
     $B \rightarrow G$   
     $B \rightarrow H$   
}

d) Determine a set of tables from based on the Minimal Cover above (5 pts).

<b><i>A,B</i></b>	<b><i>A</i></b>	<b><i>B</i></b>
C	E	G
	J	H
	K	