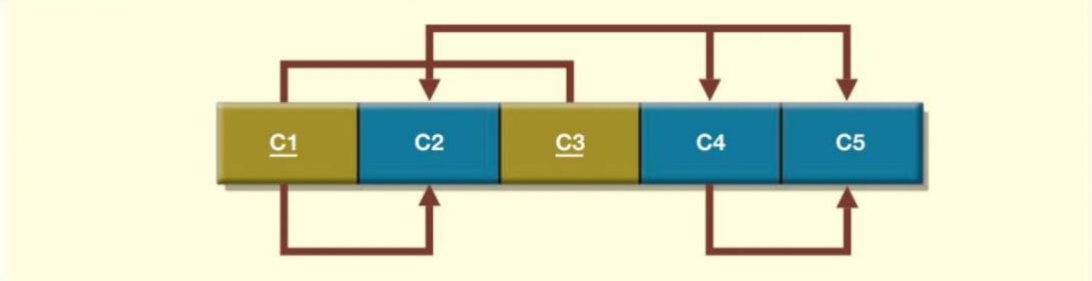
REVIEW QUESTIONS 7

1. What is normalization?
2. When is a table in 1NF?
3. When is a table in 2NF?
4. When is a table in 3NF?
5. Given the dependency diagram shown in figure below, answer questions 5a through 5c:



   a. Identify and discuss each of the indicated dependencies.
   b. Create a database whose tables are at least in 2NF, showing the dependency diagrams for each table.
   c. Create a database whose tables are at least in 3NF, showing the dependency diagrams for each table.

6. What is a partial dependency? With what normal form is it associated?
7. What three data anomalies are likely to be the result of data redundancy? How can such anomalies be eliminated?
8. Define and discuss the concept of transitive dependency.

   You may use the following table structure as an example.

   INVOICE (INV_NUM, INV_DATE, INV_AMOUNT, CUS_NUM, CUS_ADDRESS, CUS_PHONE)

PROBLEMS 7

1. Using the following INVOICE table structure, draw its dependency diagram and identify all dependencies (including all partial and transitive dependencies). You can assume that the table does not contain repeating groups and that any invoice number may reference more than one product, and each product is purchased from a single vendor. (*Hint:* This table uses a composite primary key.)

Attribute Name	Sample Value	Sample Value	Sample Value	Sample Value	Sample Value
INV_NUM	211347	211347	211347	211348	211349
PROD_NUM	AA-E3422QW	QD-300932X	RU-995748G	AA-E3422QW	GH-778345P
SALE_DATE	15-Jan-2019	15-Jan-2019	15-Jan-2019	15-Jan-2019	16-Jan-2019
PROD_LABEL	Rotary sander	0.25-in. drill bit	Band saw	Rotary sander	Power drill
VEND_CODE	211	211	309	211	157
VEND_NAME	NeverFail, Inc.	NeverFail, Inc.	BeGood, Inc.	NeverFail, Inc.	ToughGo, Inc.
QUANT_SOLD	1	8	1	2	1
PROD_PRICE	€34.46	€2.73	€31.59	€34.46	€69.32

2. Using the initial dependency diagram drawn in problem 1, remove all partial dependencies, draw the new dependency diagrams, and identify the normal forms for each table structure you created. (You may assume that any given product is supplied by a single vendor, but a vendor can supply many products)

3. Using the table structures you have created in problem 2, remove all transitive dependencies, draw the new dependency diagrams, and identify the normal forms for each table structure you created.

4. To keep track of office furniture, computers, printers, and so on, the FOUNDIT company uses the following table structure:

Attribute Name	Sample Value	Sample Value	Sample Value
ITEM_ID	231134-678	342245-225	254668-449
ITEM_LABEL	HP DeskJet 3755	HP Toner	DT Scanner
ITEM_ROOM	325	325	123
BLDG_CODE	NTC	NTC	CSF
BLDG_NAME	Nottooclear	Nottoclear	Canseefar
BLDG_MANAGER	I. B. Rightonit	I. B. Rightonit	May B. Next

Given this information, draw the dependency diagram. Make sure you label the transitive and/or partial dependencies.

5. Starting with the dependency diagram drawn for problem 4, create a set of dependency diagrams that meet 3NF requirements. Rename attributes to meet the naming conventions and create new entities and attributes as necessary.

6. Using the results of problem 5, draw the E-R diagram.

7. Given the following five sample records in the CHARTER table, draw the dependency diagram for this table structure. Make sure you label all dependencies. (The record contents are written vertically to save space. The EMP_NUM entry refers to the pilot who flew the charter trip). To save space for the dependency diagram, code the attributes A, B, C, D,…. For example, CHAR_TRIP will be coded A, CHAR_DATE will be coded B, and so on.

	Record 1	**Record 2**	**Record 3**	**Record 4**	**Record 5**
CHAR_TRIP	10232	10233	10234	10235	10236
CHAR_DATE	27-Jan-2002	27-Jan-2002	28-Jan-2002	28-Jan-2002	28-Jan-2002
CHAR_DESTINATION	STL	ATL	ATL	GNV	MEM
CHAR_MILES	580	470	510	1024	280
CUST_NUMBER	784	784	546	567	546
CUST_LNAME	Brown	Brown	Alero	Green	Alero
EMP_NUM	32	32	18	41	18
EMP_LNAME	Yantil	Yantil	Smith	Chen	Smith
AC_NUM	2098W	2098W	6711Y	6711Y	3124R
MOD_CODE	PA31-350	PA31-350	C-90	C-90	C-421
MOD_CHG_MILE	$2.12	$2.12	$3.85	$3.85	$2.37

8. Decompose the dependency diagram in problem 7 to create table structures that are all in 3NF. Make sure you label all dependencies.

9. Draw the ERD to reflect the properly decomposed dependency diagrams you created in problem 8. Make sure that the ERD yields a database that can all the data shown in problem 7. Show all entities, relationships, connectivities, optionalities, and cardinalities.