

## Homework # 1

### Data Normalization

This homework is worth 100 points (100/1000, or 10%) toward your final grade.

Create 3rd Normal Form Schemas for the business documents on the following pages. Your final 3NF column should show entities, attributes and primary keys for all the data appearing in these documents.

### Submission

You should present your finished results in a “Spreadsheet” format as provided in the example below that we looked at in class. Please save your spreadsheet as a PDF and submit the PDF via Moodle where the assignment appears in the Week Four materials.

### Spreadsheet

Record your results in columnar format imitating the spreadsheet template provided. Your spreadsheet should have four columns:

<u>Unnormalized</u>	<u>1<sup>st</sup> Normal Form</u>	<u>2<sup>nd</sup> Normal Form</u>	<u>3<sup>rd</sup> Normal Form</u>
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Begin by listing, for each document, all data elements (“attributes”) on the document in the “unnormalized” column.

List the document name in UPPER CASE and **HIGHLIGHT** it in yellow.

For example:

Unnormalized			
<b>CUSTOMER ORDER</b>			
Order Number			
Order Date			
Delivery Date			
Customer Number			
Customer Name			
Etc.			
Etc.			

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After listing all data elements (“attributes”) in the “unnormalized” column for all three documents, then go through the list and put all data into First Normal Form. Replace each document name with an entity name as needed. If an attribute appears on multiple documents (for example, CustomerName), then you should only list it once in your First Normal Form column.

Identify the Primary Keys by highlighting them in a different color other than yellow (as you see in grey in the example below.)

Do the same for the second and third normal form columns.

Your final 3NF column should contain all the data in all the documents organized by entity, listing all attributes in each entity with primary keys defined.

If an entity does not change from first to third normal form, then simply copy and paste the data in the second normal form column to show that the data is already in second normal form. HINT: you’ll know this if the entity has an atomic key – that is, NOT concatenated/compound. Without a compound key, the data is already in 2NF.

Example:

	A	B	C	D	E	F	G	H
		UNNORMALIZED		FIRST NORMAL FORM		SECOND NORMAL FORM		THIRD NORMAL FORM
1		Customer Order		Customer Order		Customer Order		Order
2		Order Number		Order Number		Order Number		Order Number
3		Order Date		Order Date		Order Date		Order Date
4		Delivery Date		Delivery Date		Delivery Date		Delivery Date
5		Customer Discount		Customer Discount		Customer Discount		discount amount
6		discount amount		discount amount		discount amount		invoiced amount
7		invoiced amount		invoiced amount		invoiced amount		customer number
8		customer number		customer number		customer number		order total
9		customer name		customer name		customer name		
10		bill to address		Contact		Contact		Customer
11		bill to city		ContactType		ContactType		customer number
12		bill to state		bill to address		bill to address		customer name
13		bill to zip		bill to city		bill to city		Contact
14		ship to address		bill to state		bill to state		ContactType
15		ship to city		bill to zip		bill to zip		bill to address
16		ship to state		ship to address		ship to address		bill to city
17		ship to zip		ship to city		ship to city		bill to state
18		Product Number		ship to state		ship to state		bill to zip
19		Description		ship to zip		ship to zip		ship to address
20		quantity ordered		order total		order total		ship to city
21		unit price		OrderProduct		OrderProduct		ship to state
22		order total		Order number		Order number		ship to zip
23				Product Number		Product Number		OrderProduct
24				Product Description		Quantity		Order number
25				Quantity		unit price		Product Number
26				unit price		total		Quantity
27						Product		unit price
28						Product Number		total
29						Product Description		Product
30								Product Number
31								Product Description
32								

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The documents that follow represent some of the data used by a small Midwestern chemical distribution company.

The reports are web pages from the company's intranet portal used by the Sales division of the company.

The data entry screen is a web page from the web-based Customer Maintenance application used to add/change/delete customers in the system.

Some of the data items deserve a little explanation:

Customers are allowed flexible prices which vary based on the customer's overall purchase volume. There are four levels of discounted prices for each product. Each customer carries a single discount code A, B, C or D. A Customer with an "A" discount code, for instance, will be charged the "A" price for all products they order. When a product is ordered by a customer, the sales person entering the order must check the customer's discount code and then charge the corresponding price for the product.

A Customer belongs to only one Sales Territory. Each customer is assigned to receive shipments from only one Warehouse.

Each Customer has a unique identifying customer number.

**Product Sales Report**

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**Product No:** 32010      **Description:** Nucleotide Emulsifier

Invoice	Inv. Date	Cust ID	Cust Name	Quantity	Price
928321	01/03/2016	3621417	J. T. Harman	20	800
928375	02/03/2016	4273765	B. Baggins	10	430
928430	04/04/2016	1672349	N. Robinson	32	1280
928774	07/19/2016	3357669	Gombler & Sons	3	138
928901	09/06/2016	1473332	Thom & Hall	15	630

**Customer Invoice**

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**Invoice No:** 928321**Invoice Date:** 01/31/2016**Customer ID** 3621417

**Name & Address** J. T. Harman & Company, LLC  
 22 Newbolt Rd.  
 Framingham, MN 52410

Product Number	Product Description	Std Price	Disc Code	Disc Price	Quantity	Price
42161	Dye Wash Benzocaine	93.50	A	90.00	10	900.00
63214	Flax Seed Oil	10.60	A	8.00	20	160.00
17719	Cod Liver Oil	14.30	A	12.00	30	360.00
19214	Vitamin D Extract	96.50	A	92.00	10	920.00
32010	Nucleotide Emulsifier	46.00	A	40.00	20	800.00
					<hr/>	<hr/>
<b>Invoice Total</b>					<b>90</b>	<b>3140.00</b>

This is an image of the Customer Data Entry screen, used to add a new customer to the system or change a customer's information.

**Customer Data Entry Screen**

Customer ID

Sales Territory

Warehouse

Customer Name

Address

Discount Code

Credit Limit

Delivery Instructions