Homework # 1

Data Normalization

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

Create 3rd Normal Forms for each of the six documents on the following pages. Then combine into a single set of 3rd Normal Form Relations depicting all known data items for this company.

You have a choice of how to format/present your finished results. "Spreadsheet" or "Schema".

Spreadsheet.

Record your results in columnar format imitating the spreadsheet template provided. Create one tab/worksheet in the spreadsheet for each of the six documents. Then create a final tab/worksheet for the combined solution. Each tab/worksheet should have four columns:

Unnormalized   1st Normal Form   2nd Normal Form   3rd Normal Form

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/or <mark>HIGHLIGHT</mark> it. Identify the candidate keys.

For example:

Unnormalized
<mark>PRODUCT SALES REPORT</mark>
Product No
Description
Invoice
Inv Date
Cust No
Name
Qty
Price

After listing all documents ("entities") and data elements ("attributes") in the "unnormalized" column, then go through the list and put all data into First Normal Form. Replace document names with entity names where possible. Then do the same for second and third normal form.

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.

Example:

	UNNORMALIZED		FIRST NORMAL FORM		SECOND NORMAL FORM		THIRD NORMAL FORM
	Customer Order		Customer Order		Customer Order		Order
	Order Number		Order Number		Order Number		Order Number
	Order Date		Order Date		Order Date		Order Date
	Delivery Date		Delivery Date		Delivery Date		Delivery Date
	Customer Discount		Customer Discount		Customer Discount		discount amount
	discount amount		discount amount		discount amount		invoiced amount
	invoiced amount		invoiced amount		invoiced amount		customer number
	customer number		customer number		customer number		order total
	customer name		customer name		customer name		
	bill to address		Contact		Contact		Customer
	bill to city		ContactType		ContactType		customer number
	bill to state		bill to address		bill to address		customer name
	bill to zip		bill to city		bill to city		Contact
	ship to address		bill to state		bill to state		ContactType
	ship to city		bill to zip		bill to zip		bill to address
	ship to state		ship to address		ship to address		bill to city
	ship to zip		ship to city		ship to city		bill to state
---	Product Number		ship to state		ship to state		bill to zip
	Description		ship to zip		ship to zip		ship to address
	quantity ordered		order total		order total		ship to city
---	unit price		OrderProduct		OrderProduct		ship to state
	order total		Order number		Order number		ship to zip
			Product Number		Product Number		OrderProduct
			Product Description		Quantity		Order number
			Quantity		unit price		Product Number
			unit price		total		Quantity
					Product		unit price
					Product Number		total
					Product Description		Product
							Product Number
							Product Description

Schema.

Record your results in schema format imitating the example provided. Create one section in your submission for each of the six documents. Then create a final section for the combined solution. Each section should have four schemas:

Unnormalized   1st Normal Form   2nd Normal Form   3rd Normal Form

Begin by listing, for each document, all data elements ("attributes") on the document in the "unnormalized" schema. List the document name in UPPER CASE and/or HIGHLIGHT it. Identify the candidate keys with underscore.

For example:

After listing all documents ("entities") and data elements ("attributes") in the "unnormalized" section, then go through the list and put all data into First Normal Form. Replace document names with entity names where possible. Then do the same for second and third normal form.

If an entity does not change from first to third normal form, then simply copy and paste the data in the second normal form section to show that the data is already in second normal form.

Example:

Unnormalized Section

CustomerOrder(OrderNumber, OrderDate, DeliveryDate, CustomerDiscount, DiscountAmount, Customer Discount, Invoiced amount, CustomerNumber, CustomerName, BillToAddress, BillToCity, BillToState, BillToZip, ShipToAddress, ShipToCity, ShipToState, ShipToZip, ProductNumber, Description, QuantityOrdered, UnitPrice, OrderTotal)

FirstNormalForm Section

CustomerOrder(OrderNumber, OrderDate, DeliveryDate, CustomerDiscount, DiscountAmount, Customer Discount, Invoiced amount, CustomerNumber, CustomerName, BillToAddress, BillToCity, BillToState, BillToZip, ShipToAddress, ShipToCity, ShipToState, ShipToZip, Order total)

OrderProduct(Order number, Product Number, ProductDescription, Quantity, UnitPrice)

SecondNormalForm Section

CustomerOrder(OrderNumber, OrderDate, DeliveryDate, CustomerDiscount, DiscountAmount, Customer Discount, Invoiced amount, CustomerNumber, CustomerName, BillToAddress, BillToCity, BillToState, BillToZip, ShipToAddress, ShipToCity, ShipToState, ShipToZip, Order total)

OrderProduct(Order number, Product Number, Quantity, Total)

Product(Product Number, Description, UnitPrice)

ThirdNormalForm Section

CustomerOrder(OrderNumber, OrderDate, DeliveryDate, CustomerDiscount, DiscountAmount, Customer Discount, Invoiced amount, Order total)

Customer(CustomerNumber, , CustomerName, BillToAddress, BillToCity, BillToState, BillToZip, ShipToAddress, ShipToCity, ShipToState, ShipToZip,)

OrderProduct(Order number, Product Number, Quantity, Total)

Product(Product Number, Description, UnitPrice)

These documents represent some of the data used by a small midwestern chemical distribution company. Some of the forms are computer-generated reports. Some are computer data-entry screens.

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 he orders. 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.

Location Code is a grid reference within a depot ("warehouse") identifying a physical palette spot or bin on the depot floor. Location Codes are only unique within Depot Code.

A customer is always served out of only one depot.

A Customer belongs to only one Sales Territory.

Each Customer has a unique identifying customer number.
There are 16 Product Classes, each product class belongs to one of four Inventory Codes.

The "Screen ID" field and the "Add/Change/Delete" fields on the online screen images are operating features of the software that displays and processes the online screens. These attributes do NOT need to be stored in a database and they can be left out of your normalized data.

Product Sales Report

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

Invoice	Inv. Date	Cust No.	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

Invoice No: 928321   **Invoice Date:** 01/31/2016

Customer 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

Invoice Total   90   3140.00

SALES TERRITORY REPORT

SALES TERRITORY 812

CUSTOMER NO.	ORDERS YTD	ACCOUNT BALANCE	ORDERS VALUE
6214312	6	254.50	1,000.00
7121416	10	0.00	500.00
9161417	20	0.00	400.00
3241718	40	400.60	500.00
6141846	50	900.00	600.00
7219612	100	25.25	700.00
6142361	204	30.60	100.00
7194871	30	32.70	200.00
8141714	60	100.00	1,000.00
	520		5,000.00

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

Customer Entry

Screen ID: C01   ☐ **Add**

Customer Number [   ]   ☐ **Change**

Sales Territory [   ]   **Depot** [   ]

Customer Name [   ]

Address [   ]

Trade Class [   ]   **Discount Code** [   ]

Substitute [   ]   **Credit Limit** [   ]

Delivery Instructions [   ]

Product Warehouse Stock Report

Product No: 42161

Depot Code	Stock Quantity	Location Code	YTD Orders
01	1,000	B 61	22,341
02	0	A 42	20,341
03	2,142	A 42	1,000
04	6,100	F 99	60,000
05	7,120	H 24	1,342
06	2,000	J 16	6,214
07	600	B 12	7,418
08	304	D 14	8,213
09	0	C 32	9,141
10	260	D 22	8,762
	_____		_____
Totals	19,526		144,772

This is an image of the Product Entry screen used to add a new product to the system, and/or change/delete an existing product from the system. Deleting a product merely marks it "inactive". Its history is NOT actually deleted from the database.

Product Entry

Screen ID:	P01	**Action** ☐ Add ☐ Change ☐ Delete
Product Number	[____]	

Weight [____]

Pack Unit [____]

Product Class [____]   **Description** [_____]

Discount Prices A [__]   **Inventory Code** [_____]

B [__]   **Standard Price** [_____]

C [__]

D [__]