

Student ID:

Student Name:

Normalization Exercise :

INVOICE

HILLTOP ANIMAL HOSPITAL

DATE: JAN 13/2002

INVOICE # 987

MR. RICHARD COOK, 123 THIS STREET, MY CITY, ONTARIO, Z5Z 6G6

<u>PET</u>	<u>PROCEDURE</u>	<u>AMOUNT</u>
ROVER	RABIES VACCINATION	30.00
MORRIS	RABIES VACCINATION	24.00
	TOTAL	54.00
	TAX (8%)	<u>4.32</u>
	AMOUNT OWING	<u>58.32</u>

UNF:

```
CREATE TABLE Invoice_UNF (  
  hospital_name VARCHAR(100),  
  invoice_date VARCHAR(20),  
  invoice_number VARCHAR(20),  
  customer_name VARCHAR(100),  
  customer_address VARCHAR(255),  
  pet_name VARCHAR(50),  
  procedure_name VARCHAR(100),  
  amount DECIMAL(10, 2),  
  total DECIMAL(10, 2),  
  tax_percentage DECIMAL(5, 2),  
  amount_owing DECIMAL(10, 2)  
);
```

Result Grid Filter Rows: Export: Wrap Cell Content:									
	hospital_name	invoice_date	invoice_number	customer_name	customer_address	pet_name			
▶	HILLTOP ANIMAL HOSPITAL	JAN 13/2002	987	MR. RICHARD COOK	123 THIS STREET, MY CITY, ONTARIO, Z5Z 6G6	ROVER			
	HILLTOP ANIMAL HOSPITAL	JAN 13/2002	987	MR. RICHARD COOK	123 THIS STREET, MY CITY, ONTARIO, Z5Z 6G6	MORRIS			

Result Grid Filter Rows: Export: Wrap Cell Content:									
number	customer_name	customer_address	pet_name	procedure_name	amount	total	tax_percentage	amount_owing	
	MR. RICHARD COOK	123 THIS STREET, MY CITY, ONTARIO, Z5Z 6G6	ROVER	RABIES VACCINATION	30.00	54.00	8.00	58.32	
	MR. RICHARD COOK	123 THIS STREET, MY CITY, ONTARIO, Z5Z 6G6	MORRIS	RABIES VACCINATION	24.00	54.00	8.00	58.32	

1NF:

```
CREATE TABLE IF NOT EXISTS Invoices_1NF (  
    InvoiceID INT AUTO_INCREMENT PRIMARY KEY,  
    InvoiceNumber VARCHAR(20),  
    InvoiceDate DATE,  
    CustomerFirstName VARCHAR(50),  
    CustomerLastName VARCHAR(50),  
    CustomerAddress VARCHAR(255),  
    CustomerCity VARCHAR(100),  
    CustomerProvince VARCHAR(50),  
    CustomerPostalCode VARCHAR(10),  
    PetName VARCHAR(50),  
    ProcedureName VARCHAR(100),  
    Amount DECIMAL(10, 2),  
    Total DECIMAL(10, 2),  
    TaxPercentage DECIMAL(5, 2),  
    AmountOwing DECIMAL(10, 2)  
);
```

	InvoiceID	InvoiceNumber	InvoiceDate	CustomerFirstName	CustomerLastName	CustomerAddress	CustomerCity	CustomerProvince
▶	1	987	2002-01-13	RICHARD	COOK	123 THIS STREET, MY CITY, ONTARIO, Z5Z 6G6	MY CITY	ONTARIO
	2	987	2002-01-13	RICHARD	COOK	123 THIS STREET, MY CITY, ONTARIO, Z5Z 6G6	MY CITY	ONTARIO
*								

		CustomerCity	CustomerProvince	CustomerPostalCode	PetName	ProcedureName	Amount	Total	TaxPercentage	AmountOwing
▶	Y, ONTARIO, Z5Z 6G6	MY CITY	ONTARIO	Z5Z 6G6	ROVER	RABIES VACCINATION	30.00	54.00	8.00	58.32
	Y, ONTARIO, Z5Z 6G6	MY CITY	ONTARIO	Z5Z 6G6	MORRIS	RABIES VACCINATION	24.00	54.00	8.00	58.32
*		NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

2NF:

```
CREATE TABLE IF NOT EXISTS Customers_2NF (  
    CustomerID INT AUTO_INCREMENT PRIMARY KEY,  
    FirstName VARCHAR(50),  
    LastName VARCHAR(50),  
    Address VARCHAR(255),  
    City VARCHAR(100),  
    Province VARCHAR(50),  
    PostalCode VARCHAR(10)  
);
```

	CustomerID	FirstName	LastName	Address	City	Province	PostalCode
▶	1	RICHARD	COOK	123 THIS STREET, MY CITY, ONTARIO, Z5Z 6G6	MY CITY	ONTARIO	Z5Z 6G6
*							

```
CREATE TABLE IF NOT EXISTS Invoices_2NF (  
    InvoiceID INT AUTO_INCREMENT PRIMARY KEY,  
    InvoiceNumber VARCHAR(20),  
    InvoiceDate DATE,  
    CustomerID INT,  
    TotalAmount DECIMAL(10, 2),  
    FOREIGN KEY (CustomerID) REFERENCES Customers_2NF(CustomerID)  
);
```

	InvoiceID	InvoiceNumber	InvoiceDate	CustomerID	TotalAmount
▶	1	987	2002-01-13	1	54.00
★	NULL	NULL	NULL	NULL	NULL

```
CREATE TABLE IF NOT EXISTS Pets_2NF (
  PetID INT AUTO_INCREMENT PRIMARY KEY,
  PetName VARCHAR(50),
  CustomerID INT,
  FOREIGN KEY (CustomerID) REFERENCES Customers_2NF(CustomerID)
);
```

	PetID	PetName	CustomerID
▶	1	ROVER	1
	2	MORRIS	1
★	NULL	NULL	NULL

```
CREATE TABLE IF NOT EXISTS Procedures_2NF (
  ProcedureID INT AUTO_INCREMENT PRIMARY KEY,
  ProcedureName VARCHAR(100)
);
```

	ProcedureID	ProcedureName
▶	1	RABIES VACCINATION
★	NULL	NULL

```
CREATE TABLE InvoiceDetails_2NF (
  InvoiceDetailID INT AUTO_INCREMENT PRIMARY KEY,
  InvoiceID INT,
  PetID INT,
  ProcedureID INT,
  Amount DECIMAL(10, 2),
  FOREIGN KEY (InvoiceID) REFERENCES Invoices_2NF(InvoiceID),
  FOREIGN KEY (PetID) REFERENCES Pets_2NF(PetID),
  FOREIGN KEY (ProcedureID) REFERENCES Procedures_2NF(ProcedureID)
);
```

	InvoiceDetailID	InvoiceID	PetID	ProcedureID	Amount
	1	987	1	1	30.00
▶	2	987	2	1	24.00
★	NULL	NULL	NULL	NULL	NULL

3NF:

```
CREATE TABLE IF NOT EXISTS Customers_3NF (  
    CustomerID INT AUTO_INCREMENT PRIMARY KEY,  
    FirstName VARCHAR(50),  
    LastName VARCHAR(50),  
    Address VARCHAR(255),  
    City VARCHAR(100),  
    Province VARCHAR(50),  
    PostalCode VARCHAR(10)  
);
```

	CustomerID	FirstName	LastName	Address	City	Province	PostalCode
▶	1	RICHARD	COOK	123 THIS STREET, MY CITY, ONTARIO, Z5Z 6G6	MY CITY	ONTARIO	Z5Z 6G6
*	NULL	NULL	NULL	NULL	NULL	NULL	NULL

```
CREATE TABLE IF NOT EXISTS Invoices_3NF (  
    InvoiceID INT AUTO_INCREMENT PRIMARY KEY,  
    InvoiceNumber VARCHAR(20),  
    InvoiceDate DATE,  
    CustomerID INT,  
    FOREIGN KEY (CustomerID) REFERENCES Customers_3NF(CustomerID)  
);
```

	InvoiceID	InvoiceNumber	InvoiceDate	CustomerID
▶	1	987	2002-01-13	1
*	NULL	NULL	NULL	NULL

```
CREATE TABLE IF NOT EXISTS Pets_3NF (  
    PetID INT AUTO_INCREMENT PRIMARY KEY,  
    PetName VARCHAR(50),  
    CustomerID INT,  
    FOREIGN KEY (CustomerID) REFERENCES Customers_3NF(CustomerID)  
);
```

	PetID	PetName	CustomerID
▶	1	ROVER	1
	2	MORRIS	1
*	NULL	NULL	NULL

```
CREATE TABLE IF NOT EXISTS Procedures_3NF (  
    ProcedureID INT AUTO_INCREMENT PRIMARY KEY,  
    ProcedureName VARCHAR(100)  
);
```

	ProcedureID	ProcedureName
▶	1	RABIES VACCINATION
*	NULL	NULL

```

CREATE TABLE IF NOT EXISTS InvoiceDetails_2NF (
    InvoiceDetailID INT AUTO_INCREMENT PRIMARY KEY,
    InvoiceID INT,
    PetID INT,
    ProcedureID INT,
    Amount DECIMAL(10, 2),
    CONSTRAINT fk_invoice_details_invoice_id FOREIGN KEY (InvoiceID) REFERENCES
Invoices_2NF(InvoiceID),
    CONSTRAINT fk_invoice_details_pet_id FOREIGN KEY (PetID) REFERENCES Pets_2NF(PetID),
    CONSTRAINT fk_invoice_details_procedure_id FOREIGN KEY (ProcedureID) REFERENCES
Procedures_2NF(ProcedureID)
);

```

	InvoiceDetailID	InvoiceID	PetID	ProcedureID	Amount
	1	987	1	1	30.00
▶	2	987	2	1	24.00
★	NULL	NULL	NULL	NULL	NULL

BCNF:

```

CREATE TABLE IF NOT EXISTS Customers_BCNF (
    CustomerID INT AUTO_INCREMENT PRIMARY KEY,
    FirstName VARCHAR(50),
    LastName VARCHAR(50),
    Address VARCHAR(255),
    City VARCHAR(100),
    Province VARCHAR(50),
    PostalCode VARCHAR(10)
);

```

	CustomerID	FirstName	LastName	Address	City	Province	PostalCode
▶	1	RICHARD	COOK	123 THIS STREET, MY CITY, ONTARIO, Z5Z 6G6	MY CITY	ONTARIO	Z5Z 6G6
★	NULL	NULL	NULL	NULL	NULL	NULL	NULL

```

CREATE TABLE IF NOT EXISTS Invoices_BCNF (
    InvoiceID INT AUTO_INCREMENT PRIMARY KEY,
    InvoiceNumber VARCHAR(20),
    InvoiceDate DATE,
    CustomerID INT,
    FOREIGN KEY (CustomerID) REFERENCES Customers_BCNF(CustomerID)
);

```

	InvoiceID	InvoiceNumber	InvoiceDate	CustomerID
▶	1	987	2002-01-13	1
★	NULL	NULL	NULL	NULL

```
CREATE TABLE IF NOT EXISTS Pets_BCNF (
  PetID INT AUTO_INCREMENT PRIMARY KEY,
  PetName VARCHAR(50),
  CustomerID INT,
  FOREIGN KEY (CustomerID) REFERENCES Customers_BCNF(CustomerID)
);
```

	PetID	PetName	CustomerID
▶	1	ROVER	1
	2	MORRIS	1
★	NULL	NULL	NULL

```
CREATE TABLE IF NOT EXISTS Procedures_BCNF (
  ProcedureID INT AUTO_INCREMENT PRIMARY KEY,
  ProcedureName VARCHAR(100)
);
```

	ProcedureID	ProcedureName
▶	1	RABIES VACCINATION
★	NULL	NULL

```
CREATE TABLE IF NOT EXISTS InvoiceDetails_BCNF (
  InvoiceDetailID INT AUTO_INCREMENT PRIMARY KEY,
  InvoiceID INT,
  PetID INT,
  ProcedureID INT,
  Amount DECIMAL(10, 2),
  CONSTRAINT fk_invoice_details_id_invoice FOREIGN KEY (InvoiceID) REFERENCES
Invoices_BCNF(InvoiceID),
  CONSTRAINT fk_invoice_details_id_pet FOREIGN KEY (PetID) REFERENCES
Pets_BCNF(PetID),
  CONSTRAINT fk_invoice_details_id_procedure FOREIGN KEY (ProcedureID) REFERENCES
Procedures_BCNF(ProcedureID)
);
```

	InvoiceDetailID	InvoiceID	PetID	ProcedureID	Amount
	1	987	1	1	30.00
▶	2	987	2	1	24.00
★	NULL	NULL	NULL	NULL	NULL