Question 1

Write a regular expression to validate addresses. You only have to accommodate the addresses in the list.

|  |  |
| --- | --- |
| **Example to validate** | **Valid?** |
| 15 Riversdale Rd, Hawthorn 3122 Vic | Yes |
| 15 Riversdale Rd Hawthorn 3122 Vic | No |
| 18 Ocean St,  Woollahra 2025 NSW | No |
| 18 Ocean St, Woollahra 2025 NSW | Yes |
| 1025 Bass Hw, Parklands 7320 Tas | Yes |
| 1025 Bass Hw, Parklands 73200 Tas | No |
| 20 Darwin Gv, Highgate 6003 WA | Yes |
| 20 Darwin Gv, Highgate WA | No |
| 20 Darwin Gv,Highgate 6003 WA | No |
| 20 Kent St, Rockhampton 4700 Qld | Yes |
| 20 Kent St, Rockhampton 4700 Qdd | No |
| 20 Kent St, Rockhampton4700 Qld | No |

Implement the following rules

1. House number is mandatory and has one to four numbers and must be followed by a space.
2. A street name starts with a capital letter followed by one or more lower case letters followed by a space. No need to accommodate names like ‘McLaren St’ (but you can if you like).
3. A street type of either Rd, St, Gv or Hw (no need to add other possibilities), followed by a comma, followed by a space.
4. A post code that consists of four numbers (no need to check if it corresponds to the state) followed by a space.
5. A state abbreviation of either Vic, NSW, Tas, WA or Qld.

Your answer:

\d{1-4} [A-Z][a-z]+ [Rd|St|Gv|Hw], [A-Z][a-z]+ \d{4} [Vic|NSW|Tas|WA|Qld]

Question 2

Consider the following XQuery:

It produces the following output:

Write the smallest XML document that can produce this outcome. You don’t have to add any elements not referenced in the query or output, meaning it has only the two messages shown and matching data.

Your answer:

<messages>

<message>

<date>

<day>1</day>

<month>January</month>

<year>2021</year>

</date>

<from>Kim</from>

<to>Thanh</to>

<msg>See you in 5 minutes</msg>

</message>

<message>

<date>

<day>1</day>

<month>January</month>

<year>2021</year>

</date>

<from>Joyce</from>

<to>Steve</to>

<msg>No time today</msg>

</message>

</messages>

Question 3

Consider the following XQuery:

It produces the following output:

Add another entry (message element) to your answer at 2a that would not be picked up by the XQuery. Just invent the data for the correctly named elements.

Your answer:

<messages>

<message>

<date>

<day>10</day>

<month>Auguest</month>

<year>2020</year>

</date>

<from>Tom</from>

<to>John</to>

<msg>Goodbye</msg>

</message>

</messages>

Question 4

**Consider the following information given to you to build a database system that keeps records of the IT assets issued to staff and discipline areas:**

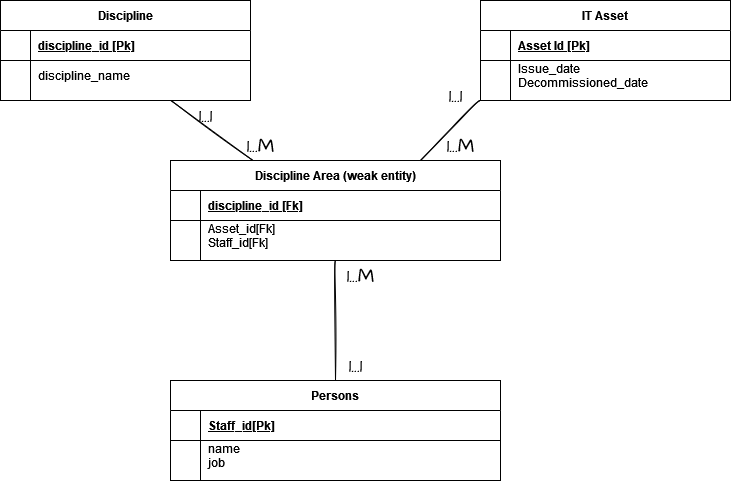
* Each IT asset has an id, an issue date and a decommissioned date. The decommissioned date is null for assets still in use.
* Each asset is used in a discipline area. There are disciplines like Business, Health and Science but also library and administration. Each discipline has an id and a name.
* Some, but not all, of the assets are issued to specific persons. Each person has a name, a staff id and a job, such as a librarian or lecturer. Each of the persons is attached to exactly one discipline area.

Based on the above, answer the following:

Draw the ER or UML diagram for the above. Mark the primary [PK] and foreign key columns [FK]. Show the cardinalities between the tables (relations).

You can use Powerpoint for the drawing, then save it as a picture and upload.

Your answer:



Question 5

Based on the diagram in Question 3a, write the DDL to implement all tables including data types, primary, foreign key constraints and specify if the attribute is nullable.

Your answer:

Create Database IT;  
Use IT;

Create table Discipline  
(  
discipline\_id int(5) UNSIGNED NOT NULL,

discipline\_name varchar(10) NOT NULL,  
PRIMARY KEY (discipline\_id)

);

Create table Persons  
(  
staff\_id int(5) UNSIGNED NOT NULL,

name varchar(10) NOT NULL,

job varchar(14) NOT NULL,  
PRIMARY KEY (staff\_id)

);

Create table IT\_assets  
(  
Asset\_id int(5) UNSIGNED NOT NULL,

Issue\_date date NOT NULL,

Decommisioned\_date date NOT NULL,  
PRIMARY KEY (Asset\_id)

);

Create table Discipline\_area

(

discipline\_id int(5) UNSIGNED NOT NULL,

Asset\_id int(5) UNSIGNED NOT NULL,

staff\_id int(5) UNSIGNED NOT NULL,

PRIMARY KEY (discipline\_id, Asset\_id, staff\_id),

FOREIGN KEY (discipline\_id) references Discipline(discipline\_id),

FOREIGN KEY (Asset\_id) references IT\_assets (Asset\_id),

FOREIGN KEY (staff\_id) references Persons(staff\_id),

)

Question 6

For each table created in questions 3a and 3b, write the SQL statements to insert 1 tuple (row) of data. **Specify the attribute for each item of data.**

Your answer:

INSERT INTO Asset (Asset\_id, Issue\_date, Decommisioned\_date )

VALUES (12345, “2021-10-14”, 2025-10-10);

INSERT INTO Discipline (discipline\_id, discipline\_name)

VALUES (14567,” Business”);

INSERT INTO Person (staff\_id, name, job)

VALUES (15478, "Bob", "librarian");

INSERT INTO Discipline\_area (discipline\_id, Asset\_id, staff\_id)

VALUES (14567, 12345, 15478);

Question 7

A university subject has enrolled students who are divided into tutorial groups for their practical work. Each tutorial has a code like ‘TU-01’, ‘TU-02’, etc. Each student, identified by their student ids, is allocated to exactly one tutorial. The tutorials have weekly start times. Each tutorial has one tutor who runs it. At the moment, we have a rather messy table that captures this information:

Are there any changes you might want to make to bring this table into first normal form?

You can describe the changes, you do not have to recreate the table.

Your answer:

There is repeating group of data in time and tutor name, so it will be better to make time into day and time and for tutor name it will be better to make it into tutor first name and tutor last name

Question 8

A university subject has enrolled students who are divided into tutorial groups for their practical work. Each tutorial has a code like ‘TU-01’, ‘TU-02’, etc. Each student, identified by their student ids, is allocated to exactly one tutorial. The tutorials have weekly start times. Each tutorial has one tutor who runs it. At the moment, we have a rather messy table that captures this information:

Divide the original table (**without applying the changes you suggested in Question 4a**) into two tables to bring it into second normal form (2NF) **but not 3NF**. List the attributes for each table and mark the primary key you suggest.

You can use Powerpoint to draw the table or simply write the tables and their attributes as lists in the provided space.

Your answer:

|  |  |
| --- | --- |
| Tutor\_id [PK] | Tutor\_name |
| 388777 | Peter Nguyen |
| 364533 | Kumar Singh |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Tute\_id [PK] | Subj\_id | time | student\_id | Tutor\_id [FK] |
| TU-01 | IT3005 | Wed 11am | 113588 | 388777 |
| TU-01 | IT3005 | Wed 11am | 101573 | 388777 |
| TU-02 | CS1009 | Thu 2PM | 106843 | 364533 |
| TU-02 | CS1009 | Thu 2PM | 121153 | 364533 |

Question 9

Create another table to bring the result into 3NF. List all three tables.You can use Powerpoint to draw the table or simply write the tables and their attributes as lists in the provided space.

Your answer:

|  |  |
| --- | --- |
| Tute\_id [FK] | student\_id |
| TU-01 | 113588 |
| TU-01 | 101573 |
| TU-02 | 106843 |
| TU-02 | 121153 |

|  |  |
| --- | --- |
| Tutor\_id [PK] | Tutor\_name |
| 388777 | Peter nguyen |
| 364533 | Kumar Singh |

|  |  |  |  |
| --- | --- | --- | --- |
| Tute\_id [PK] | Subj\_id [PK] | time | Tutor\_id [FK] |
| TU-01 | IT3005 | Wed 11am | 388777 |
| TU-02 | CS1009 | Thu 2PM | 364533 |

Question 10

**Consider the following tables with data in them. A fruit and vegetable wholesale business sells produce to retail customers, that’s why each sale item represents the sale of one single item of produce. The prices are given per kilogram. Sales quantities are kilograms.**

Write an SQL statement to fetch the cultivar and price of the apples and pears.

Your answer:

Select cultivar, Name, Price  
From FruitVeg  
Where Name= 'Apple' or 'Pear';

Question 11

**Consider the following tables with data in them. A fruit and vegetable wholesale business sells produce to retail customers, that’s why each sale item represents the sale of one single item of produce. The prices are given per kilogram. Sales quantities are kilograms.**

Write a query that shows the average price per fruit or vegetable. You can use the AVG() function. The output (result set) would look like:

Your answer:

Select Name, AVG(Price) as average\_price  
From FruitVeg  
Group by Name;

Question 12

**Consider the following tables with data in them. A fruit and vegetable wholesale business sells produce to retail customers, that’s why each sale item represents the sale of one single item of produce. The prices are given per kilogram. Sales quantities are kilograms.**

Write a query that shows how much money each customer has spent on each cultivar. (We have attributes of the same name in different tables, so you’ll have to work with aliases.) You can use a view if you think it’s easier. The output (result set) should look like:

Your answer:

Select first || ' ' || last as customer\_name, cultivar, SUM(f.price\*s.qty)as total\_amount  
From FruitVeg f Join Sales s Join Customer c  
On f.id = s.fruit   
On c.id = s.cus\_id  
Group by cultivar, customer\_name;

Question 13

**Consider the following tables with data in them. A fruit and vegetable wholesale business sells produce to retail customers, that’s why each sale item represents the sale of one single item of produce. The prices are given per kilogram. Sales quantities are kilograms.**

 The output (result set) of question 5c should look like:

Thomas Brown is new and hasn’t bought anything yet. How do you change the query at 5c to ensure he is included in the result?

Write the modified query as your answer.

Your answer:

Select first || ' ' || last as customer\_name, cultivar, SUM(f.price\*s.qty)as total\_amount  
From FruitVeg f Join Sales s Right Outer Customer c  
On f.id = s.fruit   
On c.id = s.cus\_id  
Group by cultivar,customer\_name;

Question 14

**Consider the following tables with data in them. A fruit and vegetable wholesale business sells produce to retail customers, that’s why each sale item represents the sale of one single item of produce. The prices are given per kilogram. Sales quantities are kilograms.**

The tables have been created sloppily with no foreign key constraint in place. Write the code to add the appropriate foreign key constraints. Assume the tables already exist in the database.

Your answer:

Alter table FruitVeg  
ADD Constraint id Primary Key(id);

Alter table Sale  
ADD Constraint id Primary Key(id),  
ADD FOREIGN KEY (fruit) REFERENCES FruitVeg(id),  
ADD FOREIGN KEY (cus\_id) REFERENCES Customer(id);

Alter table Customer  
ADD Constraint id Primary Key(id);

Question 15

**Consider the following tables with data in them. A fruit and vegetable wholesale business sells produce to retail customers, that’s why each sale item represents the sale of one single item of produce. The prices are given per kilogram. Sales quantities are kilograms.**

We are assuming that the **foreign key constraints have now been added**, and that the data shown in the tables is **the only data**. Thomas Brown has passed his first order. Write an Insert statement that adds a new entry to the sales table. He has bought 500 Tomatoes ‘Cherry Black’ which have an id of 3666. The sale happened today. The sales id can be an autonumber.

Your answer:

Insert into Sale(id, cus\_id,fruit, qty, date)  
Values( 1238, 365, 3666, 500, 2020-10-12);

Insert into FruitVeg(id, cultivar, name, price)  
Values( 3666, 'Cherry Black', Tomato, 5.80);

(gave a price similar to that of other fruits as price can’t be null and price hasn’t been stated in the question)

Question 16

**Consider the following tables with data in them. A fruit and vegetable wholesale business sells produce to retail customers, that’s why each sale item represents the sale of one single item of produce. The prices are given per kilogram. Sales quantities are kilograms.**

Do you think the insertion in Question 5f will succeed? Why/why not?

Your answer:

It will succeed with the modification i had made with price and the parent table. Otherwise there would have been a foreign key error as we were trying to input data into child whereas the data wasn’t present in the parent table in case of the new fruit tomato of cherry black