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Question 1: (10 marks)

As simple as the example below shows, identify the relationship for each business rule from 1 to 10.

Example:

Question) Each town may be the birthplace of many people. Each person must be born in one and only one town.

Answer)

town

1:M

Person

1. Each room may house one or more guest. Each guest may stay in one and only one room.
2. Each employee must work for one and only one department. Each department may have one or more employees.
3. Each hotel may be the host of one or more guests. Each guest may be hosted in one or more Hotels
4. Each Message must be addressed to one or more persons. Each person may be the addressee of one or more message.
5. Each shirt must have one and only one price. Each price may be for one or more shirts.
6. Each airline coupon must be used for one and only one destination. Each destination may be visited with one or more coupons.
7. Each automobile must use one and only one tire size. Each tire size may be used by one or more automobiles.

8. Each child must have one and only one mother. Each mother must be the parent of one or more children.

9. Each person must be of one and only one blood type. Each blood type may classify one or more persons.

10. A person may be on one or more junk-mail lists. Each junk list may contain one or more persons.

Question 2: (10 marks)

Consider the following schema definitions:

Branch	(<u>branchNo</u> , street, city, postcode)
Staff	(<u>staffNo</u> , fName, lName, position, sex, DOB, salary, branchNo)
PropertyforRent	(<u>propertyNo</u> , street, city, postcode, type, rooms, rent, ownerNo, staffNo, branchNo)
Client	(<u>clientNo</u> , fName, lName, telNo, prefType, maxRent)
PrivateOwner	(<u>ownerNo</u> , fName, lName, address, telNo)
Viewing	(<u>clientNo</u> , <u>propertyNo</u> , viewDate, comment)
Registration	(<u>clientNo</u> , <u>branchNo</u> , staffNo, dateJoined)

For each case below, fill in the blanks such that the SQL queries correspond to the English language statements.

1. List the address of all branch offices in London or Bristol.
 SELECT _____ FROM _____
 WHERE city='London' _____

2. List the staff with a salary between \$10000 and \$30000.
 SELECT staff_No FROM Staff
 WHERE _____

3. List the staff in descending order of salary.
 SELECT staff_No, salary FROM Staff
 ORDER BY _____

4. Find the number of different properties viewed in April 2004.
 SELECT _____ FROM Viewing
 WHERE viewDate BETWEEN '1-Apr-04' AND '30-Apr-04'

5. Find the minimum, maximum and average staff salary.
 SELECT _____, _____, _____
 FROM Staff

6. For each branch office with more than one member of staff, find the number of staff working in each branch and the sum of their salaries.
 SELECT branchNo, _____, _____ FROM Staff
 GROUP BY branchNo
 HAVING _____ >1

9. Give all managers 5% increase to their salary
 UPDATE _____ SET _____ WHERE position='Manager'

10. Delete all viewings that belong to property with property number PG4.
 DELETE FROM _____ WHERE _____

Question 3: (10 marks)

Given the file structure shown in the figure below, answer the following questions depending on the normalization concepts you have learnt this semester:

	PROJECT_CODE	PROJECT_MANAGER	MANAGER_PHONE	MANAGER_ADDRESS	PROJECT_BID_PRICE
▶	21-5Z	Holly B. Parker	904-338-3416	3334 Lee Rd., Gainesville, FL 37123	\$16,833,460.00
	25-2D	Jane D. Grant	615-898-9909	218 Clark Blvd., Nashville, TN 36362	\$12,500,000.00
	25-5A	George F. Dorts	615-227-1245	124 River Dr., Franklin, TN 29185	\$32,512,420.00
	25-9T	Holly B. Parker	904-338-3416	3334 Lee Rd., Gainesville, FL 37123	\$21,563,234.00
	27-4Q	George F. Dorts	615-227-1245	124 River Dr., Franklin, TN 29185	\$10,314,545.00
	29-2D	Holly B. Parker	904-338-3416	3334 Lee Rd., Gainesville, FL 37123	\$25,559,999.00
	31-7P	William K. Moor	904-445-2719	216 Morton Rd., Stetson, FL 30155	\$56,850,000.00

a) Is it easy to search for a manager using his first name only, or by the name of the city only? Why?

b) What data redundancies do you detect?

c) How could these redundancies lead to anomalies?

d) In details, what is your suggestion to resolve the problems of the file structure?

END OF QUESTIONS