**Complex Queries**

SQL allows queries that check whether an attribute value is NULL. Rather than using = or <> to compare an attribute value to NULL, SQL uses the comparison operators IS or IS NOT.

To Retrieve the names of all employees who do not have supervisors.

SELECT Fname, Lname

FROM EMPLOYEE

WHERE Super\_ssn IS NULL;

To retrieve the names of employees whose salary is greater than the salary of all the employees in department 5

SELECT Lname, Fname

FROM EMPLOYEE WHERE Salary > ALL ( SELECT Salary FROM EMPLOYEE WHERE Dno = 5 );

**The EXISTS and UNIQUE Functions in SQL**

EXISTS and UNIQUE are Boolean functions that return TRUE or FALSE; hence, they can be used in a WHERE clause condition. The EXISTS function in SQL is used to check whether the result of a nested query is empty (contains no tuples) or not.

The result of EXISTS is a Boolean value TRUE if the nested query result contains at least one tuple, or FALSE if the nested query result contains no tuples.

Retrieve the names of employees who have no dependents.

Q6: SELECT Fname, Lname FROM EMPLOYEE WHERE NOT EXISTS

( SELECT \* FROM DEPENDENT WHERE Ssn = Essn );

To list the names of managers who have at least one dependent.

SELECT Fname, Lname FROM EMPLOYEE WHERE

EXISTS ( SELECT \* FROM DEPENDENT WHERE Ssn = Essn )

AND

EXISTS ( SELECT \* FROM DEPARTMENT WHERE Ssn = Mgr\_ssn );

**Explicit Sets and Renaming in SQL**

It is also possible to use an explicit set of values in the WHERE clause, rather than a nested

query. Such a set is enclosed in parentheses in SQL.

To retrieve the Social Security numbers of all employees who work on project numbers 1, 2, or 3.

SELECT DISTINCT Essn FROM WORKS\_ON WHERE Pno IN (1, 2, 3);



In SQL, it is possible to rename any attribute that appears in the result of a query by adding the qualifier AS followed by the desired new name.

To retrieve the last name of each employee and his or her supervisor while renaming the resulting attribute names as Employee\_name and Supervisor\_name. The new names will appear as column headers for the query result.

SELECT E.Lname AS Employee\_name, S.Lname AS Supervisor\_name

FROM EMPLOYEE AS E, EMPLOYEE AS S

WHERE E.Super\_ssn = S.Ssn;

**Joined Tables in SQL**

The concept of a joined table (or joined relation) was incorporated into SQL to permit users to specify a table resulting from a join operation in the FROM clause of a query.

For example, consider query which retrieves the name and address of every employee who works for the ‘Research’ department. It may be easier to specify the join of the EMPLOYEE and

DEPARTMENT relations in the WHERE clause, and then to select the desired tuples

and attributes. This can be written in SQL as in Q1A:

Q1A: SELECT Fname, Lname, Address

FROM (EMPLOYEE JOIN DEPARTMENT ON Dno = Dnumber)

WHERE Dname = ‘Research’;