1. Which query creates a projection of the DEPARTMENT_NAME and LOCATION_ID columns from the DEPARTMENTS table? (Choose the best answer.)

   A. SELECT DISTINCT DEPARTMENT_NAME, LOCATION_ID
      FROM DEPARTMENTS;
   B. SELECT DEPARTMENT_NAME, LOCATION_ID
      FROM DEPARTMENTS;
   C. SELECT DEPT_NAME, LOC_ID
      FROM DEPT;
   D. SELECT DEPARTMENT_NAME AS “LOCATION_ID”
      FROM DEPARTMENTS;

2. After describing the EMPLOYEES table, you discover that the SALARY column has a data type of NUMBER(8,2). Which SALARY value(s) will not be permitted in this column? (Choose all that apply.)

   A. SALARY=12345678
   B. SALARY=123456.78
   C. SALARY=12345.678
   D. SALARY=123456
   E. SALARY=12.34

3. After describing the JOB_HISTORY table, you discover that the START_DATE and END_DATE columns have a data type of DATE. Consider the expression END_DATE-START_DATE. (Choose two correct statements.)

   A. A value of DATE data type is returned.
   B. A value of type NUMBER is returned.
   C. A value of type VARCHAR2 is returned.
   D. The expression is invalid since arithmetic cannot be performed on columns with DATE data types.
   E. The expression represents the days between the END_DATE and START_DATE less one day.

4. The DEPARTMENTS table contains a DEPARTMENT_NAME column with data type
VARCHAR2(30). (Choose two true statements about this column.)

A. This column can store character data up to a maximum of 30 characters.
B. This column must store character data that is at least 30 characters long.
C. The VARCHAR2 data type is replaced by the CHAR data type.
D. This column can store data in a column with data type VARCHAR2(50) provided that the contents are at most 30 characters long.

5. Which statement reports on unique JOB_ID values from the EMPLOYEES table? (Choose all that apply.)

A. SELECT JOB_ID FROM EMPLOYEES;
B. SELECT UNIQUE JOB_ID FROM EMPLOYEES;
C. SELECT DISTINCT JOB_ID, EMPLOYEE_ID FROM EMPLOYEES;
D. SELECT DISTINCT JOB_ID FROM EMPLOYEES;

6. Choose the two illegal statements. The two correct statements produce identical results. The two illegal statements will cause an error to be raised:

A. SELECT DEPARTMENT_ID|| ' represents the '|| DEPARTMENT_NAME||' Department' as "Department Info"
FROM DEPARTMENTS;
B. SELECT DEPARTMENT_ID|| ' represents the || DEPARTMENT_NAME||' Department' as "Department Info"
FROM DEPARTMENTS;
C. SELECT DEPARTMENT_ID|| ' represents the '||DEPARTMENT_NAME||'
' Department' "Department Info"
FROM DEPARTMENTS;
D. SELECT DEPARTMENT_ID represents the DEPARTMENT_NAME Department as
"Department Info"
FROM DEPARTMENTS;

Data Retrieval Using the SQL SELECT Statement
7. Which expressions do not return NULL values? (Choose all that apply.)

A. select ((10 + 20) * 50) + null from dual;
B. select 'this is a '||null||'test with nulls' from dual;
C. select null/0 from dual;
D. select null||'test'||null as “Test” from dual;

8. Choose the correct syntax to return all columns and rows of data from the EMPLOYEES table.

A. select all from employees;
B. select employee_id, first_name, last_name, first_name, department_id from employees;
C. select % from employees;
D. select * from employees;
E. select *.* from employees;

9. The following character literal expression is selected from the DUAL table: SELECT 'Coda''s favorite fetch toy is his orange ring' FROM DUAL; (Choose the result that is returned.)

A. An error would be returned due to the presence of two adjacent quotes
B. Coda's favorite fetch toy is his orange ring
C. Coda''s favorite fetch toy is his orange ring
D. 'Coda''s favorite fetch toy is his orange ring'

10. There are four rows of data in the REGIONS table. Consider the following SQL statement: SELECT '6 * 6' “Area” FROM REGIONS; How many rows of results are returned and what value is returned by the Area column? (Choose the best answer.)

A. 1 row returned, Area column contains value 36
B. 4 rows returned, Area column contains value 36 for all 4 rows
C. 1 row returned, Area column contains value 6 * 6
D. 4 rows returned, Area column contains value 6 * 6 for all 4 rows
E. A syntax error is returned.

**ANSWERS**
List the Capabilities of SQL SELECT Statements

1. ☑️ B. A projection is an intentional restriction of the columns returned from a table.
   ☑️* A is eliminated since the question has nothing to do with duplicates, distinctiveness, or uniqueness of data. C incorrectly selects nonexistent columns called DEPT_NAME and LOC_ID from a nonexistent table called DEPT. D returns just one of the requested columns: DEPARTMENT_NAME. Instead of additionally projecting the LOCATION_ID column from the DEPARTMENTS table, it attempts to alias the DEPARTMENT_NAME column as LOCATION_ID.

2. ☑️ A and C. Columns with NUMBER(8,2) data type can store, at most, eight digits; of which, at most, two of those digits are to the right of the decimal point. Although A and C are the correct answers, note that since the question is phrased in the negative, these values are NOT allowed to be stored in such a column. A is not allowed because it contains eight whole number digits, but the data type is constrained to store six whole number digits and two fractional digits. C is not allowed since it has three fractional digits and the data type allows a maximum of two fractional digits.
   ☑️* B, D, and E can legitimately be stored in this data type and, therefore, are the incorrect answers to this question. D shows that numbers with no fractional part are legitimate values for this column, as long as the number of digits in the whole number portion does not exceed six digits.

3. ☑️ B and E. The result of arithmetic between two date values represents a certain number of days.
   ☑️* A, C, and D are incorrect. It is a common mistake to expect the result of arithmetic between two date values to be a date as well, so A may seem plausible, but it is false.

4. ☑️ A and D. The scale of the VARCHAR2 data type, specified in brackets, determines its maximum capacity for storing character data as mentioned by A. If a data value that is at most 30 characters long is stored in any data type, it can also be stored in this column as stated by D.
   ☑️* B is incorrect because it is possible to store character data of any length up to 30 characters in this column. C is false, since the CHAR data type exists in parallel with the VARCHAR2 data type.

Execute a Basic SELECT Statement

5. ☑️ D. Unique JOB_ID values are projected from the EMPLOYEES table by applying the DISTINCT keyword to just the JOB_ID column.
   ☑️* A, B, and C are eliminated since A returns an unrestricted list of JOB_ID values including duplicates; B makes use of the UNIQUE keyword in the incorrect context; and C selects the Self Test Answers 97 distinct combination of JOB_ID and EMPLOYEE_ID values. This has the effect of returning all the rows from the EMPLOYEES table since the EMPLOYEE_ID column contains unique values for each employee record. Additionally, C returns two columns, which is not what was originally requested.
6. ✓ B and D represent the two illegal statements that will return syntax errors if they are executed. This is a tricky question because it asks for the illegal statements and not the legal statements. B is illegal because it is missing a single quote enclosing the character literal “represents the.” D is illegal because it does not make use of single quotes to enclose its character literals.

* A and C are the legal statements and, therefore, in the context of the question, are the incorrect answers. A and C appear to be different since the case of the SQL statements are different and A uses the alias keyword AS, whereas C just leaves a space between the expression and the alias. Yet both A and C produce identical results.

7. ✓ B and D do not return null values since character expressions are not affected in the same way by null values as arithmetic expressions. B and D ignore the presence of null values in their expressions and return the remaining character literals.

* A and C return null values because any arithmetic expression that involves a null will return a null.

8. ✓ D. An asterisk is the SQL operator that implies that all columns must be selected from a table.

* A, B, C, and E are incorrect. A uses the ALL reserved word but is missing any column specification and will, therefore, generate an error. B selects some columns but not all columns and, therefore, does not answer the question. C and E make use of illegal selection operators.

9. ✓ B. The key to identifying the correct result lies in understanding the role of the single quotation marks. The entire literal is enclosed by a pair of quotes to avoid the generation of an error. The two adjacent quotes are necessary to delimit the single quote that appears in literal B.

* A, C, and D are incorrect. A is eliminated since no error is returned. C inaccurately returns two adjacent quotes in the literal expression and D returns a literal with all the quotes still present. The Oracle server removes the quotes used as character delimiters after processing the literal.

10. ✓ D. The literal expression ‘6 * 6’ is selected once for each row of data in the REGIONS table.

* A, B, C, and E are incorrect. A returns one row instead of four and calculates the product 6 * 6. The enclosing quote operators render 6 * 6 a character literal and not a numeric literal that can be calculated. B correctly returns four rows but incorrectly evaluates the character literal as a numeric literal. C incorrectly returns one row instead of four and E is incorrect, because the given SQL statement can be executed.
SELF TEST

Limit the Rows Retrieved by a Query

1. Which two clauses of the SELECT statement facilitate selection and projection?

A. SELECT, FROM
B. ORDER BY, WHERE
C. SELECT, WHERE
D. SELECT, ORDER BY

2. Choose the query that extracts the LAST_NAME, JOB_ID, and SALARY values from the EMPLOYEES table for records having JOB_ID values of either SA_REP or MK_MAN and having SALARY values in the range of $1000 to $4000. The SELECT and FROM clauses are SELECT LAST_NAME, JOB_ID, SALARY FROM EMPLOYEES:

A. WHERE JOB_ID IN ('SA_REP','MK_MAN')
   AND SALARY > 1000 AND SALARY < 4000;
B. WHERE JOB_ID IN ('SA_REP','MK_MAN')
   AND SALARY BETWEEN 1000 AND 4000;
C. WHERE JOB_ID LIKE 'SA_REP%' AND 'MK_MAN%
   AND SALARY > 1000 AND SALARY < 4000;
D. WHERE JOB_ID = 'SA_REP'
   AND SALARY BETWEEN 1000 AND 4000
   OR JOB_ID='MK_MAN';

2. Which of the following WHERE clauses contains an error? The SELECT and FROM clauses are SELECT * FROM EMPLOYEES:

A. WHERE HIRE_DATE IN ('02-JUN-2004');
B. WHERE SALARY IN ('1000','4000','2000');
C. WHERE JOB_ID IN (SA_REP,MK_MAN);
D. WHERE COMMISSION_PCT BETWEEN 0.1 AND 0.5;
4. Choose the WHERE clause that extracts the DEPARTMENT_NAME values containing the character literal "er" from the DEPARTMENTS table. The SELECT and FROM clauses are SELECT DEPARTMENT_NAME FROM DEPARTMENTS:

A. WHERE DEPARTMENT_NAME IN ('%e%r');
B. WHERE DEPARTMENT_NAME LIKE '%er%';
C. WHERE DEPARTMENT_NAME BETWEEN 'e' AND 'r';
D. WHERE DEPARTMENT_NAME CONTAINS 'e%r';

5. Which two of the following conditions are equivalent to each other?

A. WHERE COMMISSION_PCT IS NULL
B. WHERE COMMISSION_PCT = NULL
C. WHERE COMMISSION_PCT IN (NULL)
D. WHERE NOT(COMMISSION_PCT IS NOT NULL)

6. Which three of the following conditions are equivalent to each other?

A. WHERE SALARY <=5000 AND SALARY >=2000
B. WHERE SALARY IN (2000,3000,4000,5000)
C. WHERE SALARY BETWEEN 2000 AND 5000
D. WHERE SALARY > 1999 AND SALARY < 5001
E. WHERE SALARY >=2000 AND <=5000

7. Choose one false statement about the ORDER BY clause.

A. When using the ORDER BY clause, it always appears as the last clause in a SELECT statement.
B. The ORDER BY clause may appear in a SELECT statement that does not contain a WHERE clause.
C. The ORDER BY clause specifies one or more terms by which the retrieved rows are sorted. These terms can only be column names.
D. Positional sorting is accomplished by specifying the numeric position of a column as it appears in the SELECT list, in the ORDER BY clause.
8. The following query retrieves the LAST_NAME, SALARY, and COMMISSION_PCT values for employees whose LAST_NAME begins with the letter R. Based on the following query, choose the ORDER BY clause that first sorts the results by the COMMISSION_PCT column, listing highest commission earners first, and then sorts the results in ascending order by the SALARY column. Any records with NULL COMMISSION_PCT must appear last:

SELECT LAST_NAME, SALARY, COMMISSION_PCT
FROM EMPLOYEES
WHERE LAST_NAME LIKE 'R%'

A. ORDER BY COMMISSION_PCT DESC, 2;
B. ORDER BY 3 DESC, 2 ASC NULLS LAST;
C. ORDER BY 3 DESC NULLS LAST, 2 ASC;
D. ORDER BY COMMISSION_PCT DESC, SALARY ASC;

9. The DEFINE command explicitly declares a session-persistent substitution variable with a specific value. How is this variable referenced in an SQL statement? Consider an expression that calculates tax on an employee’s SALARY based on the current tax rate. For the following session-persistent substitution variable, which statement correctly references the TAX_RATE variable?

DEFINE TAX_RATE=0.14

A. SELECT SALARY * :TAX_RATE TAX FROM EMPLOYEES;
B. SELECT SALARY * &TAX_RATE TAX FROM EMPLOYEES;
C. SELECT SALARY * :&TAX TAX FROM EMPLOYEES;
D. SELECT SALARY * TAX_RATE TAX FROM EMPLOYEES;

10. When using ampersand substitution variables in the following query, how many times will you be prompted to input a value for the variable called JOB the first time this query is executed?

SELECT FIRST_NAME, ' &JOB'
FROM EMPLOYEES
WHERE JOB_ID LIKE '% || &JOB || %'
AND ' &&JOB ' BETWEEN 'A' AND 'Z';

A. 0
B. 1
C. 2
D. 3
SELF TEST ANSWERS
Limit the Rows Retrieved by a Query
1. ✓ C. The SELECT clause facilitates projection by specifying the list of columns to be
projected from a table, whilst the WHERE clause facilitates selection by limiting the rows
retrieved based on its conditions.
A, B, and D are incorrect because the FROM clause specifies the source of the rows being
projected and the ORDER BY clause is used for sorting the selected rows.

2. ✓ B. The IN operator efficiently tests whether the JOB_ID for a particular row is either
SA_REP or MK_MAN, whilst the BETWEEN operator efficiently measures whether an employee’s
SALARY value falls within the required range.
A and C exclude employees who earn a salary of $1000 or $4000, since these SALARY
values are excluded by the inequality operators. C also selects JOB_ID values like SA_REP%
and MK_MAN%, potentially selecting incorrect JOB_ID values. D is half right. The first half
returns the rows with JOB_ID equal to SA_REP having SALARY values between $1000 and
$4000. However, the second part (the OR clause), correctly tests for JOB_ID equal to MK_MAN
but ignores the SALARY condition.

3. ✓ C. The character literals being compared to the JOB_ID column by the IN operator must
be enclosed by single quotation marks.
A, B, and D are syntactically correct. Notice that B does not require quotes around the
numeric literals. Having them, however, does not cause an error.

4. ✓ B. The LIKE operator tests the DEPARTMENT_NAME column of each row for values
that contain the characters "er". The percentage symbols before and after the character literal
indicate that any characters enclosing the "er" literal are permissible.
A and C are syntactically correct. A uses the IN operator, which is used to test set
membership. C tests whether the alphabetic value of the DEPARTMENT_NAME column is
between the letter "e" and the letter "r." Finally, D uses the word "contains," which cannot be
used in this context.

5. ✓ A and D. The IS NULL operator correctly evaluates the COMMISSION_PCT column for
NULL values. D uses the NOT operator to negate the already negative version of the IS NULL
operator, IS NOT NULL. Two negatives return a positive, and therefore A and D are equivalent.
B and C are incorrect since NULL values cannot be tested by the equality operator or the
IN operator.

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6. ✓ A, C, and D. Each of these conditions tests for SALARY values in the range of $2000 to
$5000.
B and E are incorrect. B excludes values like $2500 from its set, and E is illegal since it is
missing the SALARY column name reference after the AND operator.
Sort the Rows Retrieved by a Query

7. ✓ C. The terms specified in an ORDER BY clause can include column names, positional sorting, numeric values, and expressions.
   A, B, and D are true.

8. ✓ C. Positional sorting is performed, and the third term in the SELECT list, COMMISSION_PCT, is sorted first in descending order, and any NULL COMMISSION_PCT values are listed last. The second term in the SELECT list, SALARY, is sorted next in ascending order.
   A, B, and D are incorrect. A does not specify what to do with NULL COMMISSION_PCT values, and the default behavior during a descending sort is to list NULLS FIRST. B applies the NULLS LAST modifier to the SALARY column instead of the COMMISSION_PCT column, and D ignores NULLS completely.

Ampersand Substitution

9. ✓ B. A session-persistent substitution variable may be referenced using an ampersand symbol from within any SQL statement executed in that session.
   A, C, and D are incorrect. A and D attempt to reference the substitution variable using a colon prefix to its name and the variable name on its own. These are invalid references to substitution variables in SQL. C references a variable called TAX and not the variable TAX_RATE.

10. ✓ D. The first time this statement is executed, two single ampersand substitution variables are encountered before the third double ampersand substitution variable. If the first reference on line one of the query contained a double ampersand substitution, you would only be prompted to input a value once.
    A, B, and C are incorrect since you are prompted thrice to input a value for the JOB substitution variable. In subsequent executions of this statement in the same session you will not be prompted to input a value for this variable.
SELF TEST

1. Which statements regarding single-row functions are true? (Choose all that apply.)
   A. They may return more than one result.
   B. They execute once for each record processed.
   C. They may have zero or more input parameters.
   D. They must have at least one mandatory parameter.

2. Which of these are single-row character-case conversion functions? (Choose all that apply.)
   A. LOWER
   B. SMALLER
   C. INITCASE
   D. INITCAP

3. What value is returned after executing the following statement:
   SELECT LENGTH('How_long_is_a_piece_of_string?') FROM DUAL; (Choose the best answer.)
   A. 29
   B. 30
   C. 24
   D. None of the above

4. What value is returned after executing the following statement:
   SELECT SUBSTR('How_long_is_a_piece_of_string?', 5,4) FROM DUAL; (Choose the best answer.)
   A. long
   B. _long
   C. string?
   D. None of the above
5. What value is returned after executing the following statement?
   SELECT INSTR('How_long_is_a_piece_of_string?','','5,3) FROM DUAL; (Choose the best answer.)
   A. 4
   B. 14
   C. 12
   D. None of the above

6. What value is returned after executing the following statement?
   SELECT REPLACE('How_long_is_a_piece_of_string?','','') FROM DUAL; (Choose the best answer.)
   A. How long is a piece of string?
   B. How_long_is_a_piece_of_string?
   C. Howlongisapieceofstring?
   D. None of the above

7. What value is returned after executing the following statement?
   SELECT MOD(14,3) FROM DUAL; (Choose the best answer.)
   A. 3
   B. 42
   C. 2
   D. None of the above

8. Assuming SYSDATE=07-JUN-1996 12:05pm, what value is returned after executing the following statement?
   SELECT ADD_MONTHS(SYSDATE,-1) FROM DUAL; (Choose the best answer.)
   A. 07-MAY-1996 12:05pm
   B. 06-JUN-1996 12:05pm
   C. 07-JUL-1996 12:05pm
   D. None of the above
9. What value is returned after executing the following statement? Take note that 01-JAN-2009 occurs on a Thursday. (Choose the best answer.)
SELECT NEXT_DAY('01-JAN-2009','wed') FROM DUAL;

A. 07-JAN-2009
B. 31-JAN-2009
C. Wednesday
D. None of the above

10. Assuming SYSDATE=30-DEC-2007, what value is returned after executing the following statement?
SELECT TRUNC(SYSDATE,'YEAR') FROM DUAL; (Choose the best answer.)

A. 31-DEC-2007
B. 01-JAN-2008
C. 01-JAN-2007
D. None of the above
SELF TEST ANSWERS
Describe Various Types of Functions Available in SQL

1. ✓ B and C. Single-row functions execute once for every record selected in a dataset and may either take no input parameters, like SYSDATE, or many input parameters. *A and D are incorrect because a function by definition returns only one result and there are many functions with no parameters.

2. ✓ A and D. The LOWER function converts the case of the input string parameter to its lowercase equivalent, while INITCAP converts the given input parameter to title case. *B and C are not valid function names.

Use Character, Number, and Date Functions in SELECT Statements

3. ✓ B. The LENGTH function computes the number of characters in a given input string including spaces, tabs, punctuation mark, and other nonprintable special characters. *A, C, and D are incorrect.

4. ✓ A. The SUBSTR function extracts a four-character substring from the given input string starting with and including the fifth character. The characters at positions 1 to 4 are How_. Starting with the character at position 5, the next four characters form the word “long.” *B, C, and D are incorrect because B is a five-character substring beginning at position 4, while ring?, which is also five characters long, starts five characters from the end of the given string.

5. ✓ B. The INSTR function returns the position that the nth occurrence of the search string may be found after starting the search from a given start position. The search string is the underscore character, and the third occurrence of this character starting from position 5 in the source string occurs at position 14. *A, C, and D are incorrect since position 4 is the first occurrence of the search string and position 12 is the third occurrence if the search began at position 1.

6. ✓ C. All occurrences of the underscore character are replaced by an empty string, which removes them from the string. *A, B, and D are incorrect. A is incorrect because the underscore characters are not replaced by spaces, and B does not change the source string.

7. ✓ C. When 14 is divided by 3, the answer is 4 with remainder 2. *A, B, and D are incorrect.

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8. ✓ A. The minus one parameter indicates to the ADD_MONTHS function that the date to be returned must be one month prior to the given date. 
B, C, and D are incorrect. B is one day and not one month prior to the given date. C is one month after the given date.

9. ✓ A. Since the first of January 2009 falls on a Thursday, the date of the following Wednesday is six days later. 
B, C, and D are incorrect. B returns the last day of the month in which the given date falls, and C returns a character string instead of a date.

10. ✓ C. The date TRUNC function does not perform rounding and since the degree of truncation is YEAR, the day and month components of the given date are ignored and the first day of the year it belongs to is returned. 
A, B, and D are incorrect. A returns the last day in the month in which the given date occurs, and B returns a result achieved by rounding instead of truncation.
SELF TEST

1. What type of conversion is performed by the following statement?
   SELECT LENGTH(3.14285) FROM DUAL;
   (Choose the best answer.)
   
   A. Explicit conversion
   B. Implicit conversion
   C. TO_NUMBER function conversion
   D. None of the above

2. Choose any incorrect statements regarding conversion functions. (Choose all that apply.)
   
   A. TO_CHAR may convert date items to character items.
   B. TO_DATE may convert character items to date items.
   C. TO_CHAR may convert numbers to character items.
   D. TO_DATE may convert date items to character items.

Use the TO_CHAR, TO_NUMBER, and TO_DATE Conversion Functions

3. What value is returned after executing the following statement?
   SELECT TO_NUMBER(1234.49, '999999.9') FROM DUAL;
   (Choose the best answer.)
   
   A. 1234.49
   B. 001234.5
   C. 1234.5
   D. None of the above

4. What value is returned after executing the following statement?
   SELECT TO_CHAR(1234.49, '999999.9') FROM DUAL;
   (Choose the best answer.)
   
   A. 1234.49
   B. 001234.5
   C. 1234.5
   D. None of the above
5. If SYSDATE returns 12-JUL-2009, what is returned by the following statement?
SELECT TO_CHAR(SYSDATE, 'fmMONTH, YEAR') FROM DUAL;
(Choose the best answer.)
A. JUL, 2009
B. JULY, TWO THOUSAND NINE
C. JUL-09
D. None of the above

6. If SYSDATE returns 12-JUL-2009, what is returned by the following statement?
SELECT TO_CHAR(SYSDATE, 'fmDDth MONTH') FROM DUAL;
(Choose the best answer.)
A. 12TH JULY
B. 12th July
C. TWELFTH JULY
D. None of the above

7. If SYSDATE returns 12-JUL-2009, what is returned by the following statement?
SELECT TO_CHAR(TO_DATE(TO_CHAR(SYSDATE,'DD'),'DD'),'YEAR') FROM DUAL;
(Choose the best answer.)
A. 2009
B. TWO THOUSAND NINE
C. 12-JUL-2009
D. None of the above

8. What value is returned after executing the following statement?
SELECT NVL2(NULLIF('CODA','SID'),'SPANIEL','TERRIER') FROM DUAL;
(Choose the best answer.)
A. SPANIEL
B. TERRIER
C. NULL
D. None of the above
9. What value is returned after executing the following statement?
SELECT NVL(SUBSTR('AM I NULL',10),'YES I AM') FROM DUAL;
(Choose the best answer.)

A. NO  
B. NULL  
C. YES I AM  
D. None of the above

10. If SYSDATE returns 12-JUL-2009, what is returned by the following statement?
SELECT DECODE(TO_CHAR(SYSDATE,'MM'),'02','TAX DUE','PARTY') FROM DUAL;
(Choose the best answer.)

A. TAX DUE  
B. PARTY  
C. 02  
D. None of the above
SELF TEST ANSWERS
Describe Various Types of Conversion Functions Available in SQL

1. ✓ B. The number 3.14285 is given as a parameter to the LENGTH function. There is a data type mismatch, but Oracle implicitly converts the parameter to the character string '3.14285', allowing the function to operate correctly. ✓ A, C, and D are incorrect. Explicit conversion occurs when a function like TO_CHAR is executed. C is the correct length of the string '3.14285', but this is not asked for in the question.

2. ✓ D. Dates are only converted into character strings using TO_CHAR and not the TO_DATE function. ✓ A, B, and C are correct statements.

Use the TO_CHAR, TO_NUMBER, and TO_DATE Conversion Functions

3. ✓ D. An “ORA-1722: invalid number” error is returned because the statement is trying to convert a number using an incompatible format mask. If the expression was TO_NUMBER(1234.49, '999999.99'), the number 1234.9 would be returned. ✓ A, B, and D are incorrect.

4. ✓ C. For the number 1234.49 to match the character format mask with one decimal place, the number is first rounded to 1234.5 before TO_CHAR converts it into the string '1234.5'. ✓ A, B, and D are incorrect. A cannot be returned because the format mask only allows one character after the decimal point. B would be returned if the format mask was '009999.9'.

5. ✓ B. The MONTH and YEAR components of the format mask separated by a comma and a space indicate that TO_CHAR must extract the spelled out month and year values in uppercase separated by a comma and a space. The fm modifier removes extra blanks from the spelled out components. ✓ A, C, and D are incorrect. If the format mask was 'MON, YYYY' or 'MON-YY', A and C, respectively, would be returned.

6. ✓ A. The DD component returns the day of the month in uppercase. Since it is a number, it does not matter, unless the 'th' mask is applied, in which case that component is specified in uppercase. MONTH returns the month spelled out in uppercase. ✓ B, C, and D are incorrect. B would be returned if the format mask was 'fdmmth Month', and C would be returned if the format mask was 'fmDDspth MONTH'.

Lab Answer 269
Apply Conditional Expressions in a SELECT Statement

7. ✓ B. The innermost nested function is TO_CHAR(SYSDATE,'DD'), which extracts the day component of SYSDATE and returns the character 12. The next function executed is TO_DATE('12','DD') where the character 12 is cast as the day component. When such an incomplete date is provided, Oracle substitutes values from the SYSDATE function; since
SYSDATE is 12-JUL-2009, this is the date used. The outermost function executed in
TO_CHAR('12-JUL-2009','YEAR') returns the year spelled out as TWO THOUSAND NINE.
ieroial A, C, and D are incorrect.

8. ✓ A. The NULLIF function compares its two parameters and, since they are different, the
first parameter is returned. The NVL2('CODA', 'SPANIEL','TERRIER') function call returns
SPANIEL since its first parameter is not null.
ieroial B, C, and D are incorrect.

9. ✓ C. The character literal 'AM I NULL' is nine characters long. Therefore, trying to obtain
a substring beginning at the tenth character returns a null. The outer function
then becomes
NVL(NULL,'YES I AM'), resulting in the string ‘YES I AM’ being returned.
ieroial A, B, and D are incorrect.

10. ✓ B. The innermost function TO_CHAR(SYSDATE, 'MM') results in the character string
'07' being returned. The outer function is
DECODE('07','02','TAX DUE','PARTY'). Since '07'
is not equal to '02', the else component 'PARTY' is returned.
ieroial A, C, and D are incorrect. A would only be returned if the month component extracted
from SYSDATE was '02'.
SELF TEST

1. What result is returned by the following statement?
   SELECT COUNT(*) FROM DUAL; (Choose the best answer.)

   A. NULL
   B. 0
   C. 1
   D. None of the above

2. Choose one correct statement regarding group functions.
   A. Group functions may only be used when a GROUP BY clause is present.
   B. Group functions can operate on multiple rows at a time.
   C. Group functions only operate on a single row at a time.
   D. Group functions can execute multiple times within a single group.

3. What value is returned after executing the following statement?
   SELECT SUM(SALARY) FROM EMPLOYEES;
   Assume there are 10 employee records and each contains a SALARY value of 100, except for 1, which has a null value in the SALARY field. (Choose the best answer.)

   A. 900
   B. 1000
   C. NULL
   D. None of the above

4. Which values are returned after executing the following statement?
   SELECT COUNT(*), COUNT(SALARY) FROM EMPLOYEES;
   Assume there are 10 employee records and each contains a SALARY value of 100, except for 1, which has a null value in their SALARY field. (Choose all that apply.)

   A. 10 and 10
   B. 10 and NULL
   C. 10 and 9
   D. None of the above
5. What value is returned after executing the following statement?
SELECT AVG(NVL(SALARY,100)) FROM EMPLOYEES;
Assume there are ten employee records and each contains a SALARY value of 100, except for one employee, who has a null value in the SALARY field. (Choose the best answer.)

A. NULL
B. 90
C. 100
D. None of the above

6. What value is returned after executing the following statement?
SELECT SUM((AVG(LENGTH(NVL(SALARY,0))))) FROM EMPLOYEES GROUP BY SALARY;
Assume there are ten employee records and each contains a SALARY value of 100, except for one, which has a null value in the SALARY field. (Choose the best answer.)

A. An error is returned
B. 3
C. 4
D. None of the above

7. How many records are returned by the following query?
SELECT SUM(SALARY), DEPARTMENT_ID FROM EMPLOYEES GROUP BY DEPARTMENT_ID;
Assume there are 11 nonnull and 1 null unique DEPARTMENT_ID values. All records have a nonnull SALARY value. (Choose the best answer.)

A. 12
B. 11
C. NULL
D. None of the above
8. What values are returned after executing the following statement?
SELECT JOB_ID, MAX_SALARY FROM JOBS GROUP BY MAX_SALARY;
Assume that the JOBS table has ten records with the same JOB_ID value of DBA and the same MAX_SALARY value of 100. (Choose the best answer.)

A. One row of output with the values DBA, 100
B. Ten rows of output with the values DBA, 100
C. An error is returned
D. None of the above

9. How many rows of data are returned after executing the following statement?
SELECT DEPT_ID, SUM(NVL(SALARY,100)) FROM EMP
GROUP BY DEPT_ID HAVING SUM(SALARY) > 400;
Assume the EMP table has ten rows and each contains a SALARY value of 100, except for one, which has a null value in the SALARY field. The first and second five rows have DEPT_ID values of 10 and 20, respectively. (Choose the best answer.)

A. Two rows
B. One row
C. Zero rows
D. None of the above

10. How many rows of data are returned after executing the following statement?
SELECT DEPT_ID, SUM(SALARY) FROM EMP GROUP BY DEPT_ID HAVING
SUM(NVL(SALARY,100)) > 400;
Assume the EMP table has ten rows and each contains a SALARY value of 100, except for one, which has a null value in the SALARY field. The first and second five rows have DEPT_ID values of 10 and 20, respectively. (Choose the best answer.)

A. Two rows
B. One row
C. Zero rows
D. None of the above
SELF TEST ANSWERS

Describe the Group Functions

1. ✓ C. The DUAL table has one row and one column. The COUNT(*) function returns the number of rows in a table or group.
   □* □ A, B, and D are incorrect.

2. ✓ B. By definition, group functions can operate on multiple rows at a time, unlike single-row functions.
   □* □ A, C, and D are incorrect statements. A group function may be used without a GROUP BY clause. In this case, the entire dataset is operated on as a group. The COUNT function is often executed against an entire table, which behaves as one group. D is incorrect. Once a dataset has been partitioned into different groups, any group functions execute once per group.

Identify the Available Group Functions

3. ✓ A. The SUM aggregate function ignores null values and adds nonnull values. Since nine rows contain the SALARY value 100, 900 is returned.
   □* □ B, C, and D are incorrect. B would be returned if SUM(NVL(SALARY,100)) was executed. C is a tempting choice since regular arithmetic with NULL values returns a NULL result. However, the aggregate functions, except for COUNT(*), ignore NULL values.

4. ✓ C. COUNT(*) considers all rows including those with NULL values. COUNT(SALARY) only considers the nonnull rows.
   □* □ A, B, and D are incorrect.

5. ✓ C. The NVL function converts the one NULL value into 100. Thereafter, the average function adds the SALARY values and obtains 1000. Dividing this by the number of records returns 100.
   □* □ A, B, and D are incorrect. B would be returned if AVG(NVL(SALARY,0)) was selected. It is interesting to note that if AVG(SALARY) was selected, 100 would have also been returned, since the AVG function would sum the nonnull values and divide the total by the number of rows with nonnull SALARY values. So AVG(SALARY) would be calculated as: 900/9=100.

Group Data Using the GROUP BY Clause

6. ✓ C. The dataset is segmented based on the SALARY column. This creates two groups: one with SALARY values of 100 and the other with a null SALARY value. The average length of SALARY value 100 is 3 for the rows in the first group. The NULL salary value is first converted into the number 0 by the NVL function, and the average length of SALARY is 1. The SUM
function operates across the two groups adding the values 3 and 1 returning 4.  

A, B, and D are incorrect. A seems plausible since group functions may not be nested more than two levels deep. Although there are four functions, only two are group functions while the others are single-row functions evaluated before the group functions. B would be returned if the expression SUM(AVG(LENGTH(SALARY))) was selected.

7. ✓ A. There are 12 distinct DEPARTMENT_ID values. Since this is the grouping attribute, 12 groups are created, including 1 with a null DEPARTMENT_ID value. Therefore 12 rows are returned.  

B, C, and D are incorrect.

Include or Exclude Grouped Rows Using the HAVING Clause

8. ✓ C. For a GROUP BY clause to be used, a group function must appear in the SELECT list.  

A, B, and D are incorrect since the statement is syntactically inaccurate and is disallowed by Oracle. Do not mistake the column named MAX_SALARY for the MAX(SALARY) function.

9. ✓ B. Two groups are created based on their common DEPT_ID values. The group with DEPT_ID values of ten consists of five rows with SALARY values of 100 in each of them. Therefore, the SUM(SALARY) function returns 500 for this group, and it satisfies the HAVING SUM(SALARY) > 400 clause. The group with DEPT_ID values of 20 has four rows with SALARY values of 100 and one row with a NULL SALARY. SUM(SALARY) only returns 400 and this group does not satisfy the HAVING clause.  

A, C, and D are incorrect. Beware of the SUM(NVL(SALARY,100)) expression in the SELECT clause. This expression selects the format of the output. It does not restrict or limit the dataset in anyway.

10. ✓ A. Two groups are created based on their common DEPT_ID values. The group with DEPT_ID values of 10 consists of five rows with SALARY values of 100 in each of them. Therefore the SUM(NVL(SALARY,100)) function returns 500 for this group and it satisfies the HAVING SUM(SALARY) > 400 clause. The group with DEPT_ID values of 20 has four rows with SALARY values of 100 and one row with a NULL SALARY. SUM(NVL(SALARY,100)) returns 500 and this group satisfies the HAVING clause. Therefore two rows are returned.  

B, C, and D are incorrect. Although the SELECT clause contains SUM(SALARY), which returns 500 and 400 for the two groups, the HAVING clause contains the SUM(NVL(SALARY,100)) expression, which specifies the inclusion or exclusion criteria for a group-level row.
SELF TEST

1. The EMPLOYEES and DEPARTMENTS tables have two identically named columns: DEPARTMENT_ID and MANAGER_ID. Which of these statements joins these tables based only on common DEPARTMENT_ID values? (Choose all that apply.)

A. SELECT * FROM EMPLOYEES NATURAL JOIN DEPARTMENTS;
B. SELECT * FROM EMPLOYEES E NATURAL JOIN DEPARTMENTS D ON E.DEPARTMENT_ID=D.DEPARTMENT_ID;
C. SELECT * FROM EMPLOYEES NATURAL JOIN DEPARTMENTS USING (DEPARTMENT_ID);
D. None of the above

2. The EMPLOYEES and DEPARTMENTS tables have two identically named columns: DEPARTMENT_ID and MANAGER_ID. Which statements join these tables based on both column values? (Choose all that apply.)

A. SELECT * FROM EMPLOYEES NATURAL JOIN DEPARTMENTS;
B. SELECT * FROM EMPLOYEES JOIN DEPARTMENTS USING (DEPARTMENT_ID, MANAGER_ID);
C. SELECT * FROM EMPLOYEES E JOIN DEPARTMENTS D ON E.DEPARTMENT_ID=D.DEPARTMENT_ID AND E.MANAGER_ID=D.MANAGER_ID;
D. None of the above

3. Which join is performed by the following query?
SELECT E.JOB_ID, J.JOB_ID FROM EMPLOYEES E JOIN JOBS J ON (E.SALARY < J.MAX_SALARY); (Choose the best answer.)

A. Equijoin
B. Nonequijoin
C. Cross join
D. Outer join
4. Which of the following statements are syntactically correct? (Choose all that apply.)

A. SELECT * FROM EMPLOYEES E JOIN DEPARTMENTS D USING (DEPARTMENT_ID);
B. SELECT * FROM EMPLOYEES JOIN DEPARTMENTS D USING (D.DEPARTMENT_ID);
C. SELECT D.DEPARTMENT_ID FROM EMPLOYEES JOIN DEPARTMENTS D USING (DEPARTMENT_ID);
D. None of the above

5. Which of the following statements are syntactically correct? (Choose all that apply.)

A. SELECT E.EMPLOYEE_ID, J.JOB_ID PREVIOUS_JOB, E.JOB_ID CURRENT_JOB FROM JOB_HISTORY J CROSS JOIN EMPLOYEES E ON (J.START_DATE=E.HIRE_DATE);
B. SELECT E.EMPLOYEE_ID, J.JOB_ID PREVIOUS_JOB, E.JOB_ID CURRENT_JOB FROM JOB_HISTORY J JOIN EMPLOYEES E ON (J.START_DATE=E.HIRE_DATE);
C. SELECT E.EMPLOYEE_ID, J.JOB_ID PREVIOUS_JOB, E.JOB_ID CURRENT_JOB FROM JOB_HISTORY J OUTER JOIN EMPLOYEES E ON (J.START_DATE=E.HIRE_DATE);
D. None of the above

6. Choose one correct statement regarding the following query:

SELECT * FROM EMPLOYEES E
JOIN DEPARTMENTS D ON (D.DEPARTMENT_ID=E.DEPARTMENT_ID) JOIN LOCATIONS L ON (L LOCATION_ID =D LOCATION_ID);
A. Joining three tables is not permitted.
B. A Cartesian product is generated.
C. The JOIN…ON clause may be used for joins between multiple tables.
D. None of the above

7. How many rows are returned after executing the following statement?
SELECT * FROM REGIONS R1 JOIN REGIONS R2 ON (R1.REGION_ID=LENGTH(R2. REGION_NAME)/2);
The REGIONS table contains the following row data. (Choose the best answer.)

1 Europe
2 Americas
3 Asia
4 Middle East and Africa
A. 2
B. 3
C. 4
D. None of the above

8. Choose one correct statement regarding the following query.
SELECT C.COUNTRY_ID
FROM LOCATIONS L RIGHT OUTER JOIN COUNTRIES C
ON (L.COUNTRY_ID=C.COUNTRY_ID) WHERE L.COUNTRY_ID is NULL

A. No rows in the LOCATIONS table have the COUNTRY_ID values returned.
B. No rows in the COUNTRIES table have the COUNTRY_ID values returned.
C. The rows returned represent the COUNTRY_ID values for all the rows in the LOCATIONS table.
D. None of the above

9. Which of the following statements are syntactically correct? (Choose all that apply.)
A. SELECT JH.JOB_ID FROM JOB_HISTORY JH RIGHT OUTER JOIN JOBS J ON
   JH.JOB_ID=J.JOB_ID
B. SELECT JOB_ID FROM JOB_HISTORY JH RIGHT OUTER JOIN JOBS J ON
   (JH.JOB_ID=J.JOB_ID)
C. SELECT JOB_HISTORY.JOB_ID FROM JOB_HISTORY OUTER JOIN JOBS ON
JOB_HISTORY.JOB_ID=JOBS.JOB_ID
D. None of the above

10. If the REGIONS table, which contains 4 rows, is cross joined to the COUNTRIES table, which contains 25 rows, how many rows appear in the final results set? (Choose the best answer.)

A. 100 rows
B. 4 rows
C. 25 rows
D. None of the above
SELF TEST ANSWERS
Write SELECT Statements to Access Data from More Than One Table Using Equijoins and Nonequijoins

1. ☑ D. The queries in B and C incorrectly contain the NATURAL keyword. If this is removed, they will join the DEPARTMENTS and EMPLOYEES tables based on the DEPARTMENT_ID column.
   ☑ D, A, B, and C are incorrect. A performs a pure natural join that implicitly joins the two tables on all columns with identical names which, in this case, are DEPARTMENT_ID and MANAGER_ID.

2. ☑ A, B, and C. These clauses demonstrate different techniques to join the tables on both the DEPARTMENT_ID and MANAGER_ID columns.
   ☑ D is incorrect.

3. ☑ B. The join condition is an expression based on the less than inequality operator. Therefore, this join is a nonequijoin.
   ☑ A, C, and D are incorrect. A would be correct if the operator in the join condition expression was an equality operator. The CROSS JOIN keywords or the absence of a join condition would result in C being true. D would be true if one of the OUTER JOIN clause was used instead of the JOIN…ON clause.

4. ☑ A. This statement demonstrates the correct usage of the JOIN…USING clause.
   ☑ B, C, and D are incorrect. B is incorrect since only nonqualified column names are allowed in the brackets after the USING keyword. C is incorrect because the column in brackets after the USING keyword cannot be referenced with a qualifier in the SELECT clause.

5. ☑ B demonstrates the correct usage of the JOIN…ON clause.
   ☑ A, C, and D are incorrect. A is incorrect since the CROSS JOIN clause cannot contain the ON keyword. C is incorrect since the OUTER JOIN keywords must be preceded by the LEFT, RIGHT, or FULL keyword.

6. ☑ C. The JOIN…ON clause and the other join clauses may all be used for joins between multiple tables. The JOIN…ON and JOIN…USING clauses are better suited for N-way table joins.
   ☑ A, B, and D are incorrect. A is false since you may join as many tables as you wish. A Cartesian product is not created since there are two join conditions and three tables.

Join a Table to Itself Using a Self-Join
7. □ ✓ B. Three rows are returned. For the row with a REGION_ID value of 2, the REGION_NAME is Asia and half the length of the REGION_NAME is also 2. Therefore this row is returned. Lab Answer 355
The same logic results in the rows with REGION_ID values of three and four and REGION_NAME values of Europe and Americas being returned. □*✉ A, C, and D are incorrect.

View Data That Does Not Meet a Join Condition Using Outer Joins

8. □ ✓ A. The right outer join fetches the COUNTRIES rows that the inner join between the LOCATIONS and COUNTRIES tables have excluded. The WHERE clause then restricts the results by eliminating the inner join results. This leaves the rows from the COUNTRIES table with which no records from the LOCATIONS table records are associated. □*✉ B, C, and D are incorrect.

9. □ ✓ A. This statement demonstrates the correct use of the RIGHT OUTER JOIN...ON clause. □*✉ B, C, and D are incorrect. The JOB_ID column in the SELECT clause in B is not qualified and is therefore ambiguous since the table from which this column comes is not specified. C uses an OUTER JOIN without the keywords LEFT, RIGHT, or FULL.

Generate a Cartesian Product of Two or More Tables

10. □ ✓ A. The cross join associates every four rows from the REGIONS table 25 times with the rows from the COUNTRIES table yielding a result set that contains 100 rows. □*✉ B, C, and D are incorrect.
SELF TEST
Define Subqueries

1. Consider this generic description of a SELECT statement:
SELECT select_list
FROM table
WHERE condition
GROUP BY expression_1
HAVING expression_2
ORDER BY expression_3;
Where could subqueries be used? (Choose all correct answers.)
A. select_list
B. table
C. condition
D. expression_1
E. expression_2
F. expression_3

2. A query can have a subquery embedded within it. Under what circumstances could there be more than one subquery? (Choose the best answer.)
A. The outer query can include an inner query. It is not possible to have another query within the inner query.
B. It is possible to embed a single-row subquery inside a multiple-row subquery, but not the other way around.
C. The outer query can have multiple inner queries, but they must not be embedded within each other.
D. Subqueries can be embedded within each other with no practical limitations on depth.

3. Consider this statement:
select employee_id, last_name from employees where salary > (select avg(salary) from employees);
When will the subquery be executed? (Choose the best answer.)
A. It will be executed before the outer query.
B. It will be executed after the outer query.
C. It will be executed concurrently with the outer query.
D. It will be executed once for every row in the EMPLOYEES table.
4. Consider this statement:
select o.employee_id, o.last_name from employees o where
  o.salary > (select avg(i.salary) from employees i
  where i.department_id=o.department_id);
When will the subquery be executed? (Choose the best answer.)

A. It will be executed before the outer query.
B. It will be executed after the outer query.
C. It will be executed concurrently with the outer query.
D. It will be executed once for every row in the EMPLOYEES table.

5. Consider the following statement:
select last_name from employees join departments
  on employees.department_id = departments.department_id
where department_name='Executive';
and this statement:
select last_name from employees where department_id in
  (select department_id from departments where department_name='Executive');
What can be said about the two statements? (Choose two correct answers.)

A. The two statements should generate the same result.
B. The two statements could generate different results.
C. The first statement will always run successfully; the second statement will error if there are
two departments with DEPARTMENT_NAME ‘Executive.’
D. Both statements will always run successfully, even if there are two departments with
   DEPARTMENT_NAME ‘Executive.’

6. What are the distinguishing characteristics of a scalar subquery? (Choose two correct
   answers.)

A. A scalar subquery returns one row.
B. A scalar subquery returns one column.
C. A scalar subquery cannot be used in the SELECT LIST of the parent query.
D. A scalar subquery cannot be used as a correlated subquery.
7. Which comparison operator cannot be used with multiple-row subqueries? (Choose the best answer.)

A. ALL
B. ANY
C. IN
D. NOT IN
E. All the above can be used.

8. Consider this statement: select last_name, (select count(*) from departments) from employees where salary = (select salary from employees);
What is wrong with it? (Choose the best answer.)

A. Nothing is wrong—the statement should run without error.
B. The statement will fail because the subquery in the SELECT list references a table that is not listed in the FROM clause.
C. The statement will fail if the second query returns more than one row.
D. The statement will run but is extremely inefficient because of the need to run the second subquery once for every row in EMPLOYEES.

9. Which of the following statements are equivalent? (Choose two answers.)

A. select employee_id from employees where salary < all (select salary from employees where department_id=10);
B. select employee_id from employees where salary < (select min(salary) from employees where department_id=10);
C. select employee_id from employees where salary not >= any (select salary from employees where department_id=10);
D. select employee_id from employees e join departments d on e.department_id= d.department_id where e.salary < (select min(salary) from employees) and d.department_id=10;
10. Consider this statement, which is intended to prompt for an employee’s name and then find all employees who have the same job as the first employee: select last_name, employee_id from employees where job_id = (select job_id from employees where last_name = '&Name');

What would happen if a value were given for &Name that did not match with any row in EMPLOYEES? (Choose the best answer.)

A. The statement would fail with an error.
B. The statement would return every row in the table.
C. The statement would return no rows.
D. The statement would return all rows where JOB_ID is NULL.
SELF TEST ANSWERS
Define Subqueries
1. ✓ A, B, C, D, E. Subqueries can be used at all these points.
   ✗ F. A subquery cannot be used in the ORDER BY clause of a query.

2. ✓ D. Subquery nesting can be done to many levels.
   ✗ A, B, and C. A and C are wrong because subqueries can be nested. B is wrong because the number of rows returned is not relevant to nesting subqueries, only to the operators being used.

3. ✓ A. The result set of the inner query is needed before the outer query can run.
   ✗ B, C, and D. B and C are not possible because the result of the subquery is needed before the parent query can start. D is wrong because the subquery is only run once.

4. ✓ D. This is a correlated subquery, which must be run for every row in the table.
   ✗ A, B, and C. The result of the inner query is dependent on a value from the outer query; it must therefore be run once for every row.

Describe the Types of Problems That the Subqueries Can Solve
5. ✓ A, D. The two statements will deliver the same result, and neither will fail if the name is duplicated.
   ✗ B, C. B is wrong because the statements are functionally identical, though syntactically different. C is wrong because the comparison operator used, IN, can handle a multiple-row subquery.

List the Types of Subqueries
6. ✓ A, B. A scalar subquery can be defined as a query that returns a single value.
   ✗ C, D. C is wrong because a scalar subquery is the only subquery that can be used in the SELECT LIST. D is wrong because scalar subqueries can be correlated.

7. ✓ E. ALL, ANY, IN, and NOT IN are the multiple-row comparison operators.
   ✗ A, B, C, D. All of these can be used.

Write Single-Row and Multiple-Row Subqueries
8. ✓ C. The equality operator requires a single-row subquery, and the second subquery could return several rows.
   ✗ A, B, D. A is wrong because the statement will fail in all circumstances except the unlikely case where there is zero or one employees. B is wrong because this is not a problem; there need be no relationship between the source of data for the inner and outer queries. D is wrong because the subquery will only run once; it is not a correlated subquery.

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9. ☑️ √ A and B are identical.
   ☑️ ☑️ C is logically the same as A and B but syntactically is not possible; it will give an error.
   D will always return no rows, because it asks for all employees who have a salary lower than all employees. This is not an error but can never return any rows. The filter on DEPARTMENTS is not relevant.

10. ☑️ √ C. If a subquery returns NULL, then the comparison will also return NULL, meaning that no rows will be retrieved.
    ☑️ ☑️ A, B, D. A is wrong because this would not cause an error. B is wrong because a comparison with NULL will return nothing, not everything. D is wrong because a comparison with NULL can never return anything, not even other NULLs.
SELF TEST

1. Which of these set operators will not sort the rows? (Choose the best answer.)
   A. INTERSECT
   B. MINUS
   C. UNION
   D. UNION ALL

2. Which of these operators will remove duplicate rows from the final result? (Choose all that apply.)
   A. INTERSECT
   B. MINUS
   C. UNION
   D. UNION ALL

3. If a compound query contains both a MINUS and an INTERSECT operator, which will be applied first? (Choose the best answer.)
   A. The INTERSECT, because INTERSECT has higher precedence than MINUS.
   B. The MINUS, because MINUS has a higher precedence than INTERSECT.
   C. The precedence is determined by the order in which they are specified.
   D. It is not possible for a compound query to include both MINUS and INTERSECT.

4. There are four rows in the REGIONS table. Consider the following statements and choose how many rows will be returned for each: 0, 4, 8, or 16.
   A. select * from regions union select * from regions
   B. select * from regions union all select * from regions
   C. select * from regions minus select * from regions
   D. select * from regions intersect select * from regions
5. Consider this compound query: select empno, hired from emp union all select emp_id,hired,fired from ex_emp:
The columns EMP.EMPNO and EX_EMP.EMP_ID are integer; the column EMP.HIRED is timestamp; the columns EX_EMP.HIRED and EX_EMP.FIRED are date. Why will the statement fail? (Choose the best answer.)

A. Because the columns EMPNO and EMP_ID have different names
B. Because the columns EMP.HIRED and EX_EMP.HIRED are different data types
C. Because there are two columns in the first query and three columns in the second query
D. For all the reasons above
E. The query will succeed.

6. Which line of this statement will cause it to fail? (Choose the best answer.)

A. select ename, hired from current_staff
B. order by ename
C. minus
D. select ename, hired from current staff
E. where deptno=10
F. order by ename;

7. Study this statement:
select ename from emp union all select ename from ex_emp;
In what order will the rows be returned? (Choose the best answer.)

A. The rows from each table will be grouped and within each group will be sorted on ENAME.
B. The rows from each table will be grouped but not sorted.
C. The rows will not be grouped but will all be sorted on ENAME.
D. The rows will be neither grouped nor sorted.
SELF TEST ANSWERS
Describe the Set Operators

1. ✓ D. UNION ALL returns rows in the order that they are delivered by the two queries from which the compound query is made up.
   ✓ A, B, C. INTERSECT, MINUS, and UNION all use sorting as part of their execution.

2. ✓ A, B, C. INTERSECT, MINUS, and UNION all remove duplicate rows.
   ✓ D. UNION ALL returns all rows, duplicates included.

Use a Set Operator to Combine Multiple Queries into a Single Query

3. ✓ C. All set operators have equal precedence, so the precedence is determined by the sequence in which they occur.
   ✓ A, B, D. A and B are wrong because set operators have equal precedence—though this may change in future releases. D is wrong because many set operators can be used in one compound query.

4. ✓ A = 4; B = 8; C = 0; D = 4
   ✓ Note that 16 is not used; that would be the result of a Cartesian product query.

5. ✓ C. Every query in a compound query must return the same number of columns.
   ✓ A, B, D, E. A is wrong because the columns can have different names. B is wrong because the two columns are of the same data type group, which is all that was required. It therefore follows that D and E are also wrong.

Control the Order of Rows Returned

6. ✓ B. You cannot use ORDER BY for one query of a compound query; you may only place a single ORDER BY clause at the end.
   ✓ A, C, D, E, F. All these lines are legal.

7. ✓ B. The rows from each query will be together, but there will be no sorting.
   ✓ A, C, D. A is not possible with any syntax. C is wrong because that would be the result of a UNION, not a UNION ALL. D is wrong because UNION ALL will return the rows from each query grouped together.
SELF TEST

1. Which of the following commands can be rolled back?

A. COMMIT
B. DELETE
C. INSERT
D. MERGE
E. TRUNCATE
F. UPDATE

2. How can you change the primary key value of a row? (Choose the best answer.)

A. You cannot change the primary key value.
B. Change it with a simple UPDATE statement.
C. The row must be removed with a DELETE and reentered with an INSERT.
D. This is only possible if the row is first locked with a SELECT FOR UPDATE.

3. If an UPDATE or DELETE command has a WHERE clause that gives it a scope of several rows, what will happen if there is an error part way through execution? The command is one of several in a multistatement transaction. (Choose the best answer.)

A. The command will skip the row that caused the error and continue.
B. The command will stop at the error, and the rows that have been updated or deleted will remain updated or deleted.
C. Whatever work the command had done before hitting the error will be rolled back, but work done already by the transaction will remain.
D. The whole transaction will be rolled back.
4. If a table T1 has four numeric columns, C1, C2, C3, and C4, which of these statements will succeed? (Choose the best answer.)

A. insert into T1 values (1,2,3,null);
B. insert into T1 values ('1','2','3','4');
C. insert into T1 select * from T1;
D. All the statements (A, B, and C) will succeed.
E. None of the statements (A, B, or C) will succeed.

5. Study the result of this SELECT statement:
SQL> select * from t1;
C1  C2  C3  C4
----------  ----------  ----------  ----------
1  2  3  4
5  6  7  8

If you issue this statement:
insert into t1 (c1,c2) values(select c1,c2 from t1);
why will it fail? (Choose the best answer.)

A. Because values are not provided for all the table’s columns: there should be NULLs for C3 and C4.
B. Because the subquery returns multiple rows: it requires a WHERE clause to restrict the number of rows returned to one.
C. Because the subquery is not scalar: it should use MAX or MIN to generate scalar values.
D. Because the VALUES keyword is not used with a subquery.
E. It will succeed, inserting two rows with NULLs for C3 and C4.
6. Consider this statement:

```sql
insert into regions (region_id, region_name)
values ((select max(region_id)+1 from regions), 'Great Britain');
```
What will the result be? (Choose the best answer.)

A. The statement will not succeed if the value generated for REGION_ID is not unique, because REGION_ID is the primary key of the REGIONS table.
B. The statement has a syntax error because you cannot use the VALUES keyword with a subquery.
C. The statement will execute without error.
D. The statement will fail if the REGIONS table has a third column.

7. You want to insert a row and then update it. What sequence of steps should you follow? (Choose the best answer.)

A. INSERT, UPDATE, COMMIT
B. INSERT, COMMIT, UPDATE, COMMIT
C. INSERT, SELECT FOR UPDATE, UPDATE, COMMIT
D. INSERT, COMMIT, SELECT FOR UPDATE, UPDATE, COMMIT

8. If you issue this command:

```sql
update employees set salary=salary * 1.1;
```
what will be the result? (Choose the best answer.)

A. The statement will fail because there is no WHERE clause to restrict the rows affected.
B. The first row in the table will be updated.
C. There will be an error if any row has its SALARY column NULL.
D. Every row will have SALARY incremented by 10 percent, unless SALARY was NULL.

9. How can you delete the values from one column of every row in a table? (Choose the best answer.)
A. Use the DELETE COLUMN command.
B. Use the TRUNCATE COLUMN command.
C. Use the UPDATE command.
D. Use the DROP COLUMN command.

10. Which of these commands will remove every row in a table? (Choose one or more correct answers.)
A. A DELETE command with no WHERE clause
B. A DROP TABLE command
C. A TRUNCATE command
D. An UPDATE command, setting every column to NULL and with no WHERE clause

11. User JOHN updates some rows and asks user ROOPESH to log in and check the changes before he commits them. Which of the following statements is true? (Choose the best answer.)
A. ROOPESH can see the changes but cannot alter them because JOHN will have locked the rows.
B. ROOPESH will not be able to see the changes.
C. JOHN must commit the changes so that ROOPESH can see them and, if necessary, roll them back.
D. JOHN must commit the changes so that ROOPESH can see them, but only JOHN can roll them back.

12. User JOHN updates some rows but does not commit the changes. User ROOPESH queries the rows that JOHN updated. Which of the following statements is true? (Choose three correct answers.)
A. ROOPESH will not be able to see the rows because they will be locked.
B. ROOPESH will be able to see the new values, but only if he logs in as JOHN.
C. ROOPESH will see the old versions of the rows.
D. ROOPESH will see the state of the state of the data as it was when JOHN last created a SAVEPOINT.
13. Which of these commands will terminate a transaction? (Choose three correct answers.)

A. COMMIT
B. DELETE
C. ROLLBACK
D. ROLLBACK TO SAVEPOINT
E. SAVEPOINT
F. TRUNCATE
Chapter 10: Manipulating Data

SELF TEST ANSWERS
Describe Each Data Manipulation Language (DML) Statement

1. ✓ B, C, D, F. These are the DML commands: they can all be rolled back.
   ✓* A, E. COMMIT terminates a transaction, which can then never be rolled back.
   TRUNCATE is a DDL command and includes a built-in COMMIT.

2. ✓ B. Assuming no constraint violations, the primary key can updated like any other column.
   ✓* A, C, D. A is wrong because there is no restriction on updating primary keys (other than constraints).
   C is wrong because there is no need to do it in such a complex manner.
   D is wrong because the UPDATE will apply its own lock: you do not have to lock the row first.

3. ✓ C. This is the expected behavior: the statement is rolled back, and the rest of the transaction remains uncommitted.
   ✓* A, B, D. A is wrong because, while this behavior is in fact configurable, it is not enabled by default.
   B is wrong because, while this is in fact possible in the event of space errors, it is not enabled by default.
   D is wrong because only the one statement will be rolled back, not the whole transaction.

Insert Rows into a Table

4. ✓ D, A, B, and C will all succeed, even though B will force the database to do some automatic type casting.
   ✓* A, B, C, E. A, B, and C are wrong because each one will succeed.
   E is wrong because A, B, and C will all succeed.

5. ✓ D. The syntax is wrong: use either the VALUES keyword or a subquery, but not both.
   Remove the VALUES keyword, and it will run. C3 and C4 would be populated with NULLs.
   ✓* A, B, C, E. A is wrong because there is no need to provide values for columns not listed.
   B and C are wrong because an INSERT can insert a set of rows, so there is no need to restrict the number with a WHERE clause or by using MAX or MIN to return only one row.
   E is wrong because the statement is not syntactically correct.

6. ✓ C. The statement is syntactically correct, and the use of “MAX(REGION_ID) + 1” guarantees generating a unique number for the primary key column.
   ✓* A, B, D. A is wrong because the function will generate a unique value for the primary key.
   B is wrong because there is no problem using a scalar subquery to generate a value for a VALUES list. What cannot be done is to use the VALUES keyword and then a single non scalar subquery to provide all the values.
   D is wrong because if there is a third column, it will be populated with a NULL value.
Self Test Answers 447

Update Rows in a Table

7. ✓ A. This is the simplest (and therefore the best) way.
   B, C, D. All these will work, but they are all needlessly complicated: no programmer should use unnecessary statements.

8. ✓ D. Any arithmetic operation on a NULL returns a NULL, but all other rows will be updated.
   A, B, C. A and B are wrong because the lack of a WHERE clause means that every row will be processed. C is wrong because trying to do arithmetic against a NULL is not an error (though it isn’t very useful, either).

Delete Rows from a Table

9. ✓ C. An UPDATE, without a WHERE clause, is the only way.
   A, B, D. A is wrong because there is no such syntax: a DELETE affects the whole row. B is wrong because there is no such syntax: a TRUNCATE affects the whole table. D is wrong because, while this command does exist (it is part of the ALTER TABLE command), it will remove the column completely, not just clear the values out of it.

10. ✓ A, C. The TRUNCATE will be faster, but the DELETE will get there too.
    B is wrong because this will remove the table as well as the rows within it. D is wrong because the rows will still be there—even though they are populated with NULLs.

Control Transactions

11. ✓ B. The principle of isolation means that only JOHN can see his uncommitted transaction.
    A, C, D. A is wrong because transaction isolation means that no other session will be able to see the changes. C and D are wrong because a committed transaction can never be rolled back.

12. ✓ C. Transaction isolation means that no other session will be able to see the changes until they are committed.
    A, B, D. A is wrong because locking is not relevant; writers do not block readers. B is wrong because isolation restricts visibility of in-progress transactions to the session making the changes; the schema the users are connecting to does not matter. D is wrong because savepoints are only markers in a transaction; they do not affect publishing changes to other sessions.

13. ✓ A, C, F. COMMIT and ROLLBACK are the commands to terminate a transaction explicitly; TRUNCATE will do it implicitly.
    B, D, E. B is wrong because DELETE is a DML command that can be executed within a
transaction. D and E are wrong because creating savepoints and rolling back to them leave the transaction in progress.

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**Categorize the Main Database Objects**

1. If a table is created without specifying a schema, in which schema will it be? (Choose the best answer.)

   A. It will be an *orphaned* table, without a schema.
   B. The creation will fail.
   C. It will be in the SYS schema.
   D. It will be in the schema of the user creating it.
   E. It will be in the PUBLIC schema.

2. Several object types share the same namespace, and therefore cannot have the same name in the same schema. Which of the following object types is not in the same namespace as the others? (Choose the best answer.)

   A. Index
   B. PL/SQL stored procedure
   C. Synonym
   D. Table
   E. View

3. Which of these statements will fail because the table name is not legal? (Choose two answers.)

   A. create table “SELECT” (col1 date);
   B. create table “lowercase” (col1 date);
   C. create table number1 (col1 date);
   D. create table 1number (col1 date);
   E. create table update (col1 date);
4. What are distinguishing characteristics of heap tables? (Choose two answers.)

A. A heap can store variable length rows.
B. More than one table can store rows in a single heap.
C. Rows in a heap are in random order.
D. Heap tables cannot be indexed.
E. Tables in a heap do not have a primary key.

5. Which of the following data types are variable length? (Choose all correct answers.)

A. BLOB
B. CHAR
C. LONG
D. NUMBER
E. RAW
F. VARCHAR2

6. Study these statements:
create table tab1 (c1 number(1), c2 date);
alter session set nls_date_format='dd-mm-yy';
insert into tab1 values (1.1,'31-01-07');
Will the insert succeed? (Choose the best answer)

A. The insert will fail because the 1.1 is too long.
B. The insert will fail because the ’31-01-07’ is a string, not a date.
C. The insert will fail for both reasons A and B.
D. The insert will succeed.

7. Which of the following is not supported by Oracle as an internal data type? (Choose the best answer.)

A. CHAR
B. FLOAT
8. Consider this statement:
create table t1 as select * from regions where 1=2;
What will be the result? (Choose the best answer.)

A. There will be an error because of the impossible condition.
B. No table will be created because the condition returns FALSE.
C. The table T1 will be created but no rows inserted because the condition returns FALSE.
D. The table T1 will be created and every row in REGIONS inserted because the condition returns a NULL as a row filter.

9. When a table is created with a statement such as the following:
create table newtab as select * from tab;
will there be any constraints on the new table? (Choose the best answer.)

A. The new table will have no constraints, because constraints are not copied when creating tables with a subquery.
B. All the constraints on TAB will be copied to NEWTAB.
C. Primary key and unique constraints will be copied but not check and not null constraints.
D. Check and not null constraints will be copied but not unique or primary key.
E. All constraints will be copied, except foreign key constraints.

10. Which types of constraint require an index? (Choose all that apply.)

A. CHECK
B. NOT NULL
C. PRIMARY KEY
D. UNIQUE

11. A transaction consists of two statements. The first succeeds, but the second (which updates several rows) fails partway through because of a constraint violation. What will happen? (Choose the best answer.)

A. The whole transaction will be rolled back.
B. The second statement will be rolled back completely, and the first will be committed.
C. The second statement will be rolled back completely, and the first will remain uncommitted.
D. Only the one update that caused the violation will be rolled back; everything else will be committed.
E. Only the one update that caused the violation will be rolled back; everything else will remain uncommitted.
SELF TEST ANSWERS
Categorize the Main Database Objects

1. ✓ D. The schema will default to the current user.
   - A, B, C, E. A is wrong because all tables must be in a schema. B is wrong because the creation will succeed. C is wrong because the SYS schema is not a default schema. E is wrong because while there is a notional user PUBLIC, he does not have a schema at all.

2. ✓ A. Indexes have their own namespace.
   - B, C, D, E. Stored procedures, synonyms, tables, and views exist in the same namespace.

3. ✓ D, E. D violates the rule that a table name must begin with a letter, and E violates the rule that a table name cannot be a reserved word. Both rules can be bypassed by using double quotes.
   - A, B, C. These are wrong because all will succeed (though A and B are not exactly sensible).

Review the Table Structure

4. ✓ A, C. A heap is a table of variable length rows in random order.
   - B, D, E. B is wrong because a heap table can only be one table. D and E are wrong because a heap table can (and usually will) have indexes and a primary key.

List the Data Types that Are Available for Columns

5. ✓ A, C, D, E, F. All these are variable length data types.
   - B. CHAR columns are fixed length.

6. ✓ D. The number will be rounded to 1 digit, and the string will cast as a date.
   - A, B, C. Automatic rounding and type casting will correct the “errors,” though ideally they would not occur.

7. ✓ D. STRING is not an internal data type.
   - A, B, C. CHAR, FLOAT, and INTEGER are all internal data types, though not as widely used as some others.

Create a Simple Table

8. ✓ C. The condition applies only to the rows selected for insert, not to the table creation.
   - A, B, D. A is wrong because the statement is syntactically correct. B is wrong because the condition does not apply to the DDL, only to the DML. D is wrong because the condition will exclude all rows from selection.

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9. ✓ D. Check and not null constraints are not dependent on any structures other than the table
to which they apply and so can safely be copied to a new table.
A, B, C, E. A is wrong because not null and check constraint will be applied to the new table. B, C, and E are wrong because these constraints need other objects (indexes or a parent table) and so are not copied.

**Explain How Constraints Are Created at the Time of Table Creation**

10. ✓ C, D. Unique and primary key constraints are enforced with indexes.
A, B. Check and not null constraints do not rely on indexes.

11. ✓ C. A constraint violation will force a roll back of the current statement but nothing else.
A, B, D, E. A is wrong because all statements that have succeeded remain intact. B and D are wrong because there is no commit of anything until it is specifically requested. E is wrong because the whole statement will be rolled back, not just the failed row.